Table of Contents

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 40-F

[Check one]

☐ REGISTRATION STATEMENT PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

OR

☒ ANNUAL REPORT PURSUANT TO SECTION 13(a) OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended October 31, 2022 Commission File Number 001-13928

ROYAL BANK OF CANADA

(Exact name of Registrant as specified in its charter)

Canada	6029	Not Applicable
(Province or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number (if applicable))

200 Bay Street
Royal Bank Plaza
Toronto, Ontario
Canada M5J 2J5
Attention: Karen E. McCarthy
Senior Vice President, Associate General Counsel & Secretary
(416) 974-6715
(Address and telephone number of Registrant's principal executive offices)

Royal Bank of Canada
200 Vesey Street
New York, NY 19271
Attention: Matthew Abrusci
Vice President & Associate General Counsel
(212) 437-9267
(Name, address (including zip code) and telephone number (including area code) of agent for service in the United States)

copies of all correspondence should be sent to:

Erin Dion
Royal Bank of Canada
200 Bay Street
Toronto, Ontario
Canada M5J 2J5
Tel: (416) 974-4103

Donald R. Crawshaw
Sullivan & Cromwell LLP
125 Broad Street
New York, New York
USA 10004-2498
Tel: (212) 558-4000

Table of Contents

Securities registered or to be registered pursuant to Section 12(b) of the Act.

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Shares	RY	New York Stock Exchange

Securities registered or to be registered pursuant to Section 12(g) of the Act.

Not Applicable
(Title of Class)

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act.

Not Applicable
(Title of Class)

For annual reports, indicate by check mark the information filed with this Form:

☒ Annual information form ☒ Audited annual financial statements

Indicate the number of outstanding shares of each of the issuer's classes of capital or common stock as of the close of the period covered by the annual report.

Common Shares	1,385,591,247
First Preferred Shares	
Series AZ	20,000,000
Series BB	20,000,000
Series BD	24,000,000
Series BF	12,000,000
Series BH	6,000,000
Series BI	6,000,000
Series BO	14,000,000
Series BQ	1,750,000*
Series BR	1,250,000*
Series BS	1,000,000*
Series BT	750,000**
Series C-2	15,385

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days.

Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files).

Yes ☒ No ☐

*In connection with the issuance of Limited Recourse Capital Notes (LRCN) Series 1, on July 28, 2020, the Registrant issued $1,750 million of First Preferred Shares Series BQ (Series BQ) at a price of $1,000 per Series BQ. In connection with the issuance of LRCN Series 2, on November 2, 2020, the Registrant issued $1,250 million of First Preferred Shares Series BR (Series BR) at a price of $1,000 per Series BR. In connection with the issuance of LRCN Series 3, on June 8, 2021, the Registrant issued $1,000 million of First Preferred Shares Series BS (Series BS) at a price of $1,000 per Series BS. The Series BQ, Series BR and Series BS were issued to a consolidated trust to be held as trust assets in connection with the LRCN structure.
**The First Preferred Shares Series BT were issued on November 5, 2021 to certain institutional investors.

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 12b-2 of the Exchange Act.

Emerging growth company ☐

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards† provided pursuant to Section 13(a) of the Exchange Act. ☐

† The term "new or revised financial accounting standard" refers to any update issued by the Financial Accounting Standards Board to its Accounting Standards Codification after April 5, 2012.

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

CONTROLS AND PROCEDURES

Information about disclosure controls and procedures and internal control over financial reporting can be found under “Controls and procedures” on page 117 of our Management’s Discussion and Analysis set forth in Exhibit 2, and under “Management’s Report on Internal Control over Financial Reporting” which can be found on page 130 of our Financial Review set forth in Exhibit 2, which sections are incorporated by reference.

AUDIT COMMITTEE FINANCIAL EXPERTS

The Registrant’s board of directors has determined that it has three audit committee financial experts serving on its audit committee. Cynthia Devine, Frank Vettese and Jeffery Yabuki have been determined to be such audit committee financial experts and are independent, as that term is defined by the New York Stock Exchange’s listing standards applicable to the Registrant. The U.S. Securities and Exchange Commission (the “SEC”) has indicated that the designation of Cynthia Devine, Frank Vettese and Jeffery Yabuki as audit committee financial experts does not make any of them an “expert” for any purpose, impose any duties, obligations or liability on Cynthia Devine, Frank Vettese and Jeffery Yabuki that are greater than those imposed on members of the audit committee and board of directors who do not carry this designation or affect the duties, obligations or liability of any other member of the audit committee.

CODE OF ETHICS

The Registrant has adopted a code of ethics (the “Code of Conduct”) that applies to all employees, contract workers and members of the board of directors, including its principal executive officer, principal financial officer and principal accounting officer. In 2022, the Registrant adopted a revised Code of Conduct. Key amendments made to the Code of Conduct included additions related to conflicts of interest, and enhancements and clarifications to provisions related to respectful workplaces, human rights, personal information, close personal relationships, gifts and entertainment, insider information and securities trading. The full text of the Code of Conduct is set forth in Exhibit 4 and is also available on our website at rbc.com.

PRINCIPAL ACCOUNTANT FEES AND SERVICES

Information about principal accountant fees and services and a brief description of our pre-approval policies and procedures can be found under “Audit Committee” beginning on page 24 of our Annual Information Form set forth in Exhibit 1, which section is incorporated by reference. A copy of our pre- approval policies and procedures can be found in Appendix D of our Annual Information Form, which section is incorporated by reference.

OFF-BALANCE SHEET ARRANGEMENTS

Information about off-balance sheet arrangements can be found under “Off-balance sheet arrangements” beginning on page 56 of our Management’s Discussion and Analysis set forth in Exhibit 2, which section is incorporated by reference.

DISCLOSURE OF CONTRACTUAL OBLIGATIONS

Disclosure of contractual obligations can be found under “Transactional/positional risk drivers – Liquidity and funding risk” beginning on page 81 of our Management’s Discussion and Analysis set forth in Exhibit 2, which section is incorporated by reference.

IDENTIFICATION OF THE AUDIT COMMITTEE

The Registrant has a separately-designated standing audit committee. Information about the audit committee can be found under “Audit Committee” beginning on page 24 of our Annual Information Form set forth in Exhibit 1, which section is incorporated by reference.

UNDERTAKING

The Registrant undertakes to make available, in person or by telephone, representatives to respond to inquiries made by the Commission staff, and to furnish promptly, when requested to do so by the Commission staff, information relating to: the securities in relation to which the obligation to file an annual report on Form 40-F arises; or transactions in said securities.

SUMMARY OF SIGNIFICANT DIFFERENCES FROM NYSE CORPORATE GOVERNANCE RULES

A summary of significant ways corporate governance practices followed by the Registrant differ from corporate governance practices required to be followed by U.S. Domestic Companies under the New York Stock Exchange’s listing standards (disclosure required by section 303A.11 of the NYSE Listed Company Manual) is available on the Registrant’s corporate governance website at rbc.com/governance.

DISCLOSURE PURSUANT TO SECTION 13(r) OF THE SECURITIES EXCHANGE ACT OF 1934

In accordance with section 13(r) of the U.S. Securities Exchange Act of 1934, we are required to disclose certain Iran-related activities. We maintain a robust economic sanctions compliance program which monitors compliance with economic sanctions requirements in the jurisdictions in which we operate and we believe we have been in compliance with relevant economic sanctions legislation throughout fiscal 2022.

We currently maintain certain non-U.S. dollar denominated accounts for the Embassy of the Islamic Republic of Iran in Canada (the “Iranian Embassy”). Any funds in these accounts are frozen by Ontario court order in connection with civil litigation, which is being monitored.

In fiscal 2022 these accounts generated less than $3,000 in gross revenue and less than $3,000 in net income.

*Information contained in or otherwise accessible through the websites mentioned in this report does not form part of this report. All references to websites are inactive textual references and for your information only.

Table of Contents

SIGNATURES

Pursuant to the requirements of the Exchange Act, the Registrant certifies that it meets all of the requirements for filing on Form 40-F and has duly caused this annual report to be signed on its behalf by the undersigned, thereto duly authorized.

ROYAL BANK OF CANADA

By: /s/ David McKay
Name: David McKay
Title: President and Chief Executive Officer

Date: November 30, 2022

Table of Contents

INDEX TO EXHIBITS

Exhibit	Exhibit No.
Royal Bank of Canada Annual Information Form dated November 29, 2022	1
Financial Review • Management's Discussion and Analysis • Caution Regarding Forward-Looking Statements • Management's Responsibility for Financial Reporting • Management's Report on Internal Control over Financial Reporting • Report of Independent Registered Public Accounting Firm • Consolidated Financial Statements	2
Consent of Independent Registered Public Accounting Firm	3
Code of Conduct	4
Return on Equity and Assets Ratios	5
Rule 13a-14(a)/15d-14(a) Certifications • Certification of the Registrant's Chief Executive Officer • Certification of the Registrant's Chief Financial Officer	31
Section 1350 Certifications • Certification of the Registrant's Chief Executive Officer • Certification of the Registrant's Chief Financial Officer	32
Interactive Data File (formatted as Inline XBRL)	101
Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)	104



ROYAL BANK OF CANADA

ANNUAL INFORMATION FORM

November 29, 2022

CAUTION REGARDING FORWARD-LOOKING STATEMENTS

From time to time, we make written or oral forward-looking statements within the meaning of certain securities laws, including the "safe harbour" provisions of the *United States Private Securities Litigation Reform Act* of 1995 and any applicable Canadian securities legislation. We may make forward-looking statements in this Annual Information Form and in the documents incorporated by reference herein, in other filings with Canadian regulators or the United States (U.S.) Securities and Exchange Commission (SEC), in reports to shareholders, and in other communications. Forward-looking statements in this document and in the documents incorporated by reference herein include, but are not limited to, statements relating to our financial performance objectives, vision and strategic goals, the economic, market, and regulatory review and outlook for Canadian, U.S., U.K., European and global economies, the regulatory environment in which we operate, the impact from rising interest rates, the expected closing of the transaction involving HSBC Bank Canada, the Strategic priorities and Outlook sections for each of our business segments, the risk environment including our credit risk, market risk, liquidity and funding risk as set out in our 2022 Management's Discussion and Analysis for the fiscal year ended October 31, 2022 (the 2022 Management's Discussion and Analysis), the direction of the coronavirus (COVID-19) pandemic and its potential impact on our business operations, financial results, condition and objectives and on the global economy and financial market conditions, and our climate- and sustainability-related beliefs, targets and goals (including our net-zero and sustainable finance commitments). The forward-looking information contained in this Annual Information Form and in the documents incorporated by reference is presented for the purpose of assisting the holders of our securities and financial analysts in understanding our financial position and results of operations as at and for the periods ended on the dates presented, as well as our financial performance objectives, vision and strategic goals, and may not be appropriate for other purposes. Forward-looking statements are typically identified by words such as "believe", "expect", "foresee", "forecast", "anticipate", "intend", "estimate", "goal", "commit", "target", "objective", "plan" and "project" and similar expressions of future or conditional verbs such as "will", "may", "might", "should", "could" or "would".

By their very nature, forward-looking statements require us to make assumptions and are subject to inherent risks and uncertainties, which give rise to the possibility that our predictions, forecasts, projections, expectations or conclusions will not prove to be accurate, that our assumptions may not be correct, that our financial performance, environmental & social or other objectives, vision and strategic goals will not be achieved, and that our actual results may differ materially from such predictions, forecasts, projections, expectations or conclusions. We caution readers not to place undue reliance on these statements as a number of risk factors could cause our actual results to differ materially from the expectations expressed in such forward-looking statements. These factors – many of which are beyond our control and the effects of which can be difficult to predict – include: credit, market, liquidity and funding, insurance, operational, regulatory compliance (which could lead to us being subject to various legal and regulatory proceedings, the potential outcome of which could include regulatory restrictions, penalties and fines), strategic, reputation, competitive, model, legal and regulatory environment, systemic risks, and other risks discussed in the risk sections of our Annual Report for the fiscal year ended October 31, 2022 (the 2022 Annual Report) including business and economic conditions in the geographic regions in which we operate, Canadian housing and household indebtedness, information technology and cyber risks, geopolitical uncertainty, environmental and social risk (including climate change), digital disruption and innovation, privacy, data and third-party related risks, regulatory changes, culture and conduct risks, the effects of changes in government fiscal, monetary and other policies, tax risk and transparency, and the emergence of widespread health emergencies or public health crises such as pandemics and epidemics, including the COVID-19 pandemic and its impact on the global economy, financial market conditions and our business operations, and financial results, condition and objectives. Additional factors that could cause actual results to differ materially from the expectations in such forward-looking statements can be found in the risk section of our 2022 Annual Report.

We caution that the foregoing list of risk factors is not exhaustive and other factors could also adversely affect our results. When relying on our forward-looking statements to make decisions with respect to us, investors and others should carefully consider the foregoing factors and other uncertainties and potential events. Material economic assumptions underlying the forward-looking statements contained in this Annual Information Form are set out in the Economic, market and regulatory review and outlook section and for each business segment under the Strategic priorities and Outlook headings in our 2022 Annual Report. Except as required by law, we do not undertake to update any forward-looking statement, whether written or oral, that may be made from time to time by us or on our behalf.

Additional information about these and other factors can be found in the risk sections of our 2022 Management's Discussion and Analysis contained in our 2022 Annual Report.

TABLE OF CONTENTS

		MD&A Incorporated by Reference
CORPORATE STRUCTURE	1	
Name, Address and Incorporation	1	
Intercorporate Relationships	1	
GENERAL DEVELOPMENT OF THE BUSINESS	1	
Three Year History	1	21-24, 229*
DESCRIPTION OF THE BUSINESS	3	
General Summary	3	21-24, 29-53
Seasonality	3	54-55
Competition	3	29-53
Government Regulation and Supervision – Canada	4	
Government Regulation and Supervision – United States	6	
Risk Factors	10	58-104
Environmental and Social Policies	10	101-104
DESCRIPTION OF CAPITAL STRUCTURE	11	
General Description	11	105-114
Prior Sales	13	105-114, 209*, 210-212*
Constraints	13	
Ratings	14	87
MARKET FOR SECURITIES	16	
Trading Price and Volume	16	
DIVIDENDS	18	111-113, 210-212*
SECURITIES SUBJECT TO CONTRACTUAL RESTRICTION ON TRANSFER	18	
DIRECTORS AND EXECUTIVE OFFICERS	19	
Directors	19	
Committees of the Board	20	
Executive Officers	21	
Ownership of Securities	22	
Cease Trade Orders, Bankruptcies, Penalties or Sanctions	22	
Conflicts of Interest	23	
LEGAL PROCEEDINGS AND REGULATORY ACTIONS	23	219-220*
INTEREST OF MANAGEMENT AND OTHERS IN MATERIAL TRANSACTIONS	23	
TRANSFER AGENT AND REGISTRAR	24	
EXPERTS	24	
AUDIT COMMITTEE	24	
Audit Committee Mandate	24	
Composition of Audit Committee	24	
Relevant Education and Experience of Audit Committee Members	24	
Pre-Approval Policies and Procedures	25	
Independent Registered Public Accounting Firm Fees	26	
ADDITIONAL INFORMATION	27	
TRADEMARKS	27	
APPENDIX A – PRINCIPAL SUBSIDIARIES	28	
APPENDIX B – EXPLANATION OF RATINGS AND OUTLOOK	29	
APPENDIX C – AUDIT COMMITTEE MANDATE	32	
APPENDIX D – PRE-APPROVAL POLICIES AND PROCEDURES	38	

*Notes 19, 20, 25 and 33 to the 2022 Annual Consolidated Financial Statements for the fiscal year ended October 31, 2022 (the 2022 Annual Consolidated Financial Statements) for Royal Bank of Canada are incorporated by reference herein.

INFORMATION IS AT OCTOBER 31, 2022, UNLESS OTHERWISE NOTED.

CORPORATE STRUCTURE

Name, Address and Incorporation[1]

Royal Bank of Canada is a Schedule I bank under the *Bank Act* (Canada), which constitutes its charter. The Bank was created as Merchants Bank in 1864 and was incorporated under the "Act to Incorporate the Merchants' Bank of Halifax" assented to June 22, 1869. The Bank changed its name to The Royal Bank of Canada in 1901 and to Royal Bank of Canada in 1990.

The Bank's corporate headquarters are located at Royal Bank Plaza, 200 Bay Street, Toronto, Ontario, Canada and its head office is located at 1 Place Ville-Marie, Montreal, Quebec, Canada.

Intercorporate Relationships

Information about intercorporate relationships with principal subsidiaries, including place of incorporation and percentage of securities owned by the Bank, is provided in Appendix A.

GENERAL DEVELOPMENT OF THE BUSINESS

Three Year History

Our business strategies and actions are guided by our vision, "To be among the world's most trusted and successful financial institutions." Our three strategic goals are:

- In Canada, to be the undisputed leader in financial services;
- In the U.S., to be the preferred partner to corporate, institutional and high net worth clients and their businesses; and
- In select global financial centres, to be a leading financial services partner valued for our expertise.

In 2020, the Canadian economy contracted and the unemployment rate rose after COVID-19 containment measures led to an unprecedented decline in economic activity. The U.S. economy also contracted and GDP in the Euro area and the U.K. declined amid the spread of the COVID-19 pandemic and containment measures. In 2020, RBC reported net income of $11.4 billion, down 11% from the prior year, reflecting higher provisions for credit losses, as the Bank built reserves given the unprecedented challenges brought on by the COVID-19 pandemic, in addition to the impact of lower interest rates. Lower results in Personal & Commercial Banking and Wealth Management were partially offset by robust earnings in Capital Markets, as well as higher results in Investor & Treasury Services and Insurance.

In 2021, the Canadian economy showed growth. Although the unemployment rate remained above pre-pandemic levels, labour markets improved substantially and household purchasing power continued to be supported by large amounts of savings. The U.S. economy also showed growth and similarly, in the Euro area and the U.K., GDP rose amid the lifting of containment measures across member states.

In 2021, RBC reported net income of $16.1 billion, up 40% from the prior year, reflecting higher earnings in Personal & Commercial Banking, Capital Markets, Wealth Management, and Insurance, partially offset by lower earnings in Investor & Treasury Services, as well as releases of provisions on performing loans primarily driven by improvements in our macroeconomic and credit quality outlook. 2021 also saw the

[1] When we say "we", "us", "our", or "RBC", we mean Royal Bank of Canada and its subsidiaries, as applicable. References to "the Bank" mean Royal Bank of Canada without its subsidiaries.

appointments of Nadine Ahn to the role of Chief Financial Officer and Maria Douvas to the role of Chief Legal Officer. Neil McLaughlin also assumed responsibility for RBC Ventures.

In 2022, while global inflation pressures eased with the price of key commodities and shipping costs declining from peak levels, inflation pressures broadened across a wide array of goods and services. Consumer demand continued to outpace available supply, and labour shortages drove wages higher, adding to potentially longer-lasting price pressures. Central banks are responding by increasing interest rates more quickly than previously expected. Higher interest rates, elevated inflation and a decline in the value of equities are reducing household confidence and purchasing power. In Canada, output growth was supported by recovery from the COVID-19 pandemic in the travel and hospitality sectors and increased activity in the oil and gas, and mining sectors reflecting higher global commodity prices. The U.S. and Canadian economies are expected to undergo moderate recessions in calendar 2023. In the U.S., while inflation rates began to decrease as global supply chain disruptions eased, and the price of gasoline declined from higher levels in the spring, price growth remained very high and broad-based. Recessions in the Euro Area and the U.K. have likely already started with higher interest rates adding to surging inflation and disruptions from the war in Ukraine. Bond yields have increased substantially from the second calendar quarter of 2022 as central banks respond to high inflation.

In 2022, RBC reported net income of $15.8 billion, down 2% from last year, reflecting lower results in Capital Markets and Insurance, partially offset by higher earnings in Personal & Commercial Banking, Wealth Management, and Investor & Treasury Services. 2022 also reflects lower releases of provisions on performing loans.

2022 also saw the appointment of Kelly Pereira to the role of Chief Human Resources Officer.

We continue to monitor and prepare for regulatory developments and changes in a manner that seeks to ensure compliance with new requirements, while mitigating adverse business or financial impacts. Such impacts could result from new or amended laws or regulations and the expectations of those who enforce them. Significant developments include continuing changes to global and domestic standards for capital and liquidity, changes to the Canadian corporate income tax rate, changes to federal mortgage rules, climate-related regulatory activity, interest rate benchmark reform, U.S. regulatory reform and legislative developments on technology and cyber risk as well as data privacy. A high level summary of the key regulatory changes that have the potential to increase or decrease our costs and the complexity of our operations is included in the Legal and regulatory environment risk section of our 2022 Annual Report. For a discussion on risk factors resulting from these and other developments which may affect our business and financial results, refer to the risks sections of our 2022 Annual Report. For further details on our framework and activities to manage risks, refer to the risk and Capital management sections of our 2022 Annual Report.

Our acquisitions that have influenced the general development of our business over the past three years are summarized in the following table:

Business Segment	Acquisitions	Key Characteristics
Wealth Management	Brewin Dolphin Holdings PLC (2022)	• Acquisition creates a premier wealth manager in the U.K., Channel Islands and Ireland.
Personal & Commercial Banking	MDBilling.ca (2022)	• Acquisition supports RBC Healthcare's strategy to provide innovative solutions for physicians.

On November 29, 2022, we entered into an agreement to acquire 100% of the common shares of HSBC Bank Canada for an all-cash purchase price of $13.5 billion. The transaction is expected to close by late 2023 subject to the satisfaction of customary closing conditions, including regulatory approvals. We will also purchase all of the existing preferred shares and subordinated debt of HSBC Bank Canada held directly or indirectly by HSBC Holdings plc at par value.

Additional information can also be found under "Overview and outlook" beginning on page 21, "Key corporate events of 2022" on page 23 and in Note 33 "Subsequent events" on page 229 of our 2022 Management's Discussion and Analysis, which sections and note are incorporated by reference herein.

DESCRIPTION OF THE BUSINESS

General Summary

Royal Bank of Canada is a global financial institution with a purpose-driven, principles-led approach to delivering leading performance. Our success comes from the 95,000+ employees who leverage their imaginations and insights to bring our vision, values and strategy to life so we can help our clients thrive and communities prosper. As Canada's biggest bank and one of the largest in the world, based on market capitalization, we have a diversified business model with a focus on innovation and providing exceptional experiences to our 17 million clients in Canada, the U.S. and 27 other countries.

Our business segments are Personal & Commercial Banking, Wealth Management, Insurance, Investor & Treasury Services and Capital Markets. Our business segments are supported by Corporate Support.

Additional information about our business and each segment (including segment results) can be found under "Overview and outlook" beginning on page 21 and under "Business segment results" beginning on page 29 of our 2022 Management's Discussion and Analysis, which sections are incorporated by reference herein.

Seasonality

Information about seasonality is provided under "Quarterly results and trend analysis" on page 54 of our 2022 Management's Discussion and Analysis, which section is incorporated by reference herein.

Competition

Our competition in Personal & Commercial Banking includes other Schedule 1 banks, independent trust companies, foreign banks, credit unions, caisses populaires, auto financing companies and emerging entrants to the financial services industry, in Canada; other banks, trust companies and investment management companies serving retail and corporate clients, as well as public institutions, in the Caribbean; and other Canadian banking institutions that have U.S. operations, in the U.S.

Our Canadian Wealth Management business competes with domestic banks and trust companies, investment counselling firms, bank-owned full-service brokerages and boutique brokerages, mutual fund companies, and global private banks. In Canada, bank-owned wealth managers continue to be the major players. Our U.S. Wealth Management business (including City National) operates in a fragmented and highly competitive industry and competitors include other broker-dealers, commercial banks and other financial institutions that service high net worth and ultra-high net worth individuals, entrepreneurs and their businesses. Our Global Asset Management business faces competition in Canada from banks, insurance companies and asset management organizations; in the U.S. from independent asset management firms, as well as those that are part of national and international banks and insurance companies; and internationally from asset managers that are owned by international banks, as well as national and regional asset managers in the geographies where we serve clients. Competitors to our International Wealth Management business include global wealth managers, traditional private banks and domestic wealth managers.

In our Canadian Insurance business, many of our competitors specialize in either life or health or in property and casualty products. In our International Insurance business we compete in the global reinsurance market which is competitive with significant market opportunities in the U.S., U.K., and Europe. Market share is largely held by a small number of reinsurers, with RBC Insurance continuing to have steady growth.

In our Investor & Treasury Services business, our asset services business competes against the world's largest custodians in selected countries in North America, Europe and the U.K. Our transaction banking business competes against the largest banks in Canada.

Our Capital Markets business is a market leader in Canada and competes with large global investment banks in the U.S. Outside North America, we have a targeted presence in the U.K. and Europe, Australia, Asia and other markets aligned with our global expertise.

Additional information about our competition can be found under "Business segment results" beginning on page 29 of our 2022 Management's Discussion and Analysis, which section is incorporated by reference herein.

Government Regulation and Supervision – Canada

The Bank is a "Schedule I" bank under the *Bank Act* (Canada) (*Bank Act*), and, as such, is a federally regulated financial institution. It has Canadian insurance and trust and loan company subsidiaries that are also federally regulated financial institutions (FRFI Subsidiaries and, together with the Bank, FRFIs) governed by (respectively) the *Insurance Companies Act* (Canada) and the *Trust and Loan Companies Act* (Canada). The activities of the FRFI Subsidiaries are also regulated under provincial and territorial laws in respect of their activities in the provinces and territories. In certain provinces, some of the Bank's capital markets and wealth management activities are regulated under provincial securities laws (which are administered and enforced by securities regulatory authorities).

The Office of the Superintendent of Financial Institutions (OSFI), an independent agency of the Government of Canada, reports to the Minister of Finance (the Minister) for the supervision of the FRFIs. OSFI is required, at least once a year, to examine the affairs and business of each FRFI for the purpose of determining whether the FRFI is complying with the provisions of its governing statute and it is in sound financial condition, and report to the Minister. The FRFIs are also required to make periodic filings and reports to OSFI.

The FRFIs are also subject to regulation under the *Financial Consumer Agency of Canada Act* (*FCAC Act*).[2] The Financial Consumer Agency of Canada (Agency), among other things, enforces consumer-related provisions of the federal statutes which govern these financial institutions. The Commissioner of the Agency must report to the Minister on all matters connected with the administration of the *FCAC Act* and consumer provisions of other federal statutes, including the *Bank Act*, *Trust and Loan Companies Act* and *Insurance Companies Act*. The FRFIs are also subject to provincial and territorial laws of general application.

The Bank and the following subsidiaries are member institutions of the Canada Deposit Insurance Corporation (CDIC): Royal Trust Corporation of Canada, The Royal Trust Company, Royal Bank Mortgage Corporation and RBC Investor Services Trust. CDIC insures certain deposits held at its member institutions. Under the *Bank Act*, the Bank is prohibited from engaging in or carrying on any business other than the business of banking, except as permitted under that statute. The business of banking includes providing any financial services; acting as a financial agent; providing investment counselling services and portfolio management services; issuing payment, credit or charge cards; and operating payment, credit or charge card plans.

The Bank has broad powers to invest in securities, but is limited in making "substantial investments" in or in controlling certain types of entities. A "substantial investment" will arise through direct or indirect beneficial ownership of voting shares carrying more than 10 per cent of the voting rights attached to all outstanding voting shares of a corporation, shares representing more than 25 per cent of the shareholders' equity in a corporation, or interests representing more than 25 per cent of the ownership interests in any unincorporated entity. The Bank can make controlling, and in certain circumstances, non-controlling

[2] For the Bank's trust subsidiaries, only their retail deposit taking activities are subject to regulation under the *FCAC Act*.

substantial investments in certain entities in accordance with the investment provisions under the *Bank Act*. Some substantial investments may be made only with the prior approval of the Minister or the Superintendent of Financial Institutions (the Superintendent).

Each FRFI is also required to maintain, in relation to its operations, adequate capital and liquidity, and OSFI may direct financial institutions to increase capital and/or to provide additional liquidity.

Bail-in Regime

Canada has a bank recapitalization regime (the Bail-in Regime) for domestic systemically important banks, including the Bank. Under the *Canada Deposit Insurance Corporation Act*, in circumstances where the Bank has ceased, or is about to cease, to be viable, the Governor in Council may, upon recommendation of the Minister that he or she is of the opinion that it is in the public interest to do so, by order:

- vest in CDIC the shares and subordinated debt of the Bank specified in the order (a vesting order);
- appoint CDIC as receiver in respect of the Bank (a receivership order);
- if a receivership order has been made, direct the Minister to incorporate a federal institution designated in the order as a bridge institution wholly-owned by CDIC and specifying the date and time as of which the Bank's deposit liabilities are assumed (a bridge bank order); or
- if a vesting order or receivership order has been made, direct CDIC to carry out a conversion, by converting or causing the Bank to convert, in whole or in part – by means of a transaction or series of transactions and in one or more steps – the shares and liabilities of the Bank that are subject to the Bail-in Regime into common shares of the Bank or any of its affiliates (a conversion order).

Upon the making of a conversion order, prescribed shares and liabilities under the Bail-in Regime that are subject to that conversion order will, to the extent converted, be converted into common shares of the Bank or any of its affiliates, as determined by CDIC. Subject to certain exceptions, senior debt issued on or after September 23, 2018, with an initial or amended term to maturity (including explicit or embedded options) greater than 400 days, that is unsecured or partially secured and that has been assigned a CUSIP or ISIN or similar identification number is subject to a bail-in conversion. For a description of Canadian bank resolution powers and the consequent risk factors attaching to certain liabilities of the Bank reference is made to rbc.com/investor-relations/_assets-custom/pdf/Bail-in-Disclosure.pdf.

The *Proceeds of Crime (Money Laundering) and Terrorist Financing Act* (the Act) is applicable to all of our businesses in Canada. The Act implements specific measures designed to detect and deter money laundering and the financing of terrorist activities. Further, the Act sets out obligations related to deterring and detecting money laundering and terrorist financing from a global perspective, in order to minimize the possibility that RBC could become a party to these activities. RBC has enterprise-wide anti-money laundering policies and procedures which assist in reducing the risk of facilitating money laundering and terrorist financing activities.

Broker-Dealer/Investment Management Subsidiaries

The activities of certain of the Bank's subsidiaries, such as RBC Dominion Securities Inc. (RBC DS), RBC Direct Investing Inc. (RBC DI), Royal Mutual Funds Inc. (RMFI), RBC Global Asset Management Inc., Phillips, Hager & North Investment Funds Ltd. (PH&N IF), RBC Phillips, Hager & North Investment Counsel Inc. and RBC InvestEase Inc., which act as securities dealers (including investment dealers, mutual fund dealers and exempt market dealers), advisors (investment counsel/portfolio manager) or investment fund managers are regulated in Canada under provincial and territorial securities laws (which are administered and enforced by the applicable securities regulatory authorities) and, for investment dealers and mutual fund dealers, by the rules of the applicable self-regulatory organization (the New Self-Regulatory Organization of Canada (New SRO) to be formed by the amalgamation of the Investment Industry

Regulatory Organization of Canada and the Mutual Fund Dealers Association of Canada (MFDA) effective January 1, 2023). Each of RBC DS and RBC DI are members of the Canadian Investor Protection Fund. Customers' accounts are protected by the Canadian Investor Protection Fund within specified limits. A brochure describing the nature and limits of coverage is available to customers upon request. RMFI and PH&N IF are each members of the MFDA Investor Protection Corporation, which protects against certain losses of customer property held by an insolvent MFDA member; similarly, a brochure describing the nature and limits of coverage is also available to customers upon request. It is anticipated that, in conjunction with the amalgamation forming the New SRO, the Canadian Investor Protection Fund and the MFDA Investor Protection Corporation will amalgamate to form a single compensation/contingency fund organization, known at this time as new IPF, which will be independent from the New SRO.

Insurance

The activities of the Bank's regulated Canadian insurance subsidiaries, RBC Life Insurance Company (RBC Life) and RBC Insurance Company of Canada (RICC), are federally governed by the *Insurance Companies Act* and by provincial legislation in each province and territory in which they carry on business. In addition, the *Bank Act* sets out a framework for insurance activities that the Bank may or may not carry out. The Bank may administer, promote and provide advice in relation to certain authorized types of insurance and may conduct any aspect of the business of insurance, other than the underwriting of insurance, outside of Canada and in respect of risks outside Canada. However, in Canada, the Bank may not act as agent for any person in the placing of insurance. The Bank can promote an insurance company, agent or broker or non-authorized types of insurance (e.g. life and home and automobile insurance) to certain prescribed groups where the promotion takes place outside of physical bank branches. Additionally, and subject to applicable restrictions under the *Bank Act*, RBC Wealth Management Financial Services Inc., a wholly owned indirect subsidiary of the Bank, is licensed under applicable provincial and territorial laws to sell insurance products, including individual and group life and living benefits insurance along with money products such as annuities and segregated funds, for both related and independent insurance companies in Canada.

RBC Life is a member of Assuris, which is a not-for-profit organization that protects Canadian life insurance policyholders against loss of benefits due to the financial failure of a member company. RICC is a member of the Property and Casualty Insurance Compensation Corporation, which is the corporation protecting Canadian property and casualty policyholders against loss of benefits due to the financial failure of a member company.

RBC Insurance Agency Ltd., another wholly owned indirect Bank subsidiary, is a licensed insurance agency that distributes insurance products underwritten by non-RBC entities. These products include home and auto insurance that is underwritten by an unaffiliated insurance company.

Government Regulation and Supervision – United States

Banking

In the U.S., the Bank is characterized as a foreign banking organization (FBO). Generally, the operations of an FBO and its U.S. subsidiaries and offices are subject to the same comprehensive regulatory regime that governs the operations of U.S. domestic banking organizations. The Bank's U.S. businesses are subject to supervision and oversight by various U.S. authorities, including federal and state regulators, as well as self-regulatory organizations. An FBO must meet several conditions in order to maintain "well managed" status for U.S. bank regulatory purposes: (i) the FBO must have received a composite regulatory rating of "satisfactory" or better for its U.S. branch, agency and commercial lending company operations following its last regulatory examination, (ii) the FBO's home country supervisor must consent to it expanding its activities in the U.S. to include activities permissible for a financial holding company (FHC), (iii) the FBO's management must meet standards comparable to those required for a U.S. bank subsidiary of an FHC, and (iv) each U.S. depository institution subsidiary of the FBO and/or bank holding company (BHC) must be deemed to be "well managed", which is based on regulatory examination ratings.

Under the *International Banking Act* of 1978, as amended (IBA) and the *Bank Holding Company Act* of 1956, as amended (BHCA), all of the Bank's U.S. banking operations are subject to supervision and regulation by the Board of Governors of the Federal Reserve System (Federal Reserve). Under the IBA, the BHCA, and related regulations of the Federal Reserve, the Bank generally may not open a branch, agency or representative office in the U.S., nor acquire five per cent or more of the voting stock of any U.S. bank or BHC, without notice to or prior approval of the Federal Reserve. The Federal Reserve is the U.S. "umbrella regulator" responsible for supervision and oversight of the Bank's consolidated U.S. activities. The Federal Reserve consults with and obtains information from other prudential and functional U.S. regulators that exercise supervisory authority over the Bank's various U.S. operations. Reports of financial condition and other information relevant to the Bank's U.S. businesses are regularly filed with the Federal Reserve.

In 2000, the Bank became a U.S. FHC, as authorized by the Federal Reserve. Pursuant to the *Gramm-Leach-Bliley Act* of 1999, as amended, an FHC may engage in, or acquire companies engaged in, a broader range of financial and related activities than are permitted to banking organizations that do not maintain FHC status. To qualify as an FHC, the Bank, as an FBO and BHC, must meet certain capital requirements and must be deemed to be "well managed" for U.S. bank regulatory purposes. In addition, any U.S. depository institution subsidiaries of the FBO or BHC must also meet certain capital requirements and be deemed to be "well managed" and must have at least a "satisfactory" rating under the *Community Reinvestment Act* of 1977, as amended.

The Federal Reserve, however, has the authority to limit an FHC's ability to conduct activities that would otherwise be permissible if the FHC or any of its U.S. depositary institution subsidiaries does not satisfactorily meet certain capital requirements or is not deemed to be "well managed". In such cases, the Federal Reserve may impose corrective capital and/or managerial requirements, as well as additional limitations or conditions. If the deficiencies persist, the FHC may be required to divest its U.S. depository institution subsidiaries or to cease engaging in activities other than the business of banking and certain closely related activities. If any insured depository institution subsidiary of an FHC fails to maintain at least a "satisfactory" rating under the *Community Reinvestment Act* of 1977, as amended, the FHC would be subject to restrictions on certain new activities and acquisitions.

On July 21, 2010, the *Dodd-Frank Wall Street Reform and Consumer Protection Act* (*Dodd-Frank Act*) was enacted. The statute effected significant changes to U.S. financial regulations and required rulemaking by the U.S. financial regulators, with material cross-border implications. Section 165 of the *Dodd-Frank Act* required the Federal Reserve to establish *Enhanced Prudential Standards for Foreign Banking Organizations* (Regulation YY). Amongst other regulatory requirements, Regulation YY required the Bank to establish an intermediate holding company (IHC) organized under U.S. law. The IHC is required to hold, directly or indirectly, the Bank's entire ownership interest in its U.S. insured depository institution subsidiaries and other U.S. subsidiaries (excluding so called section 2(h)(2) companies and branch subsidiaries acquired by debt previously contracted). In June 2018, the Bank established a two-tier BHC structure in the U.S., consisting of RBC US Group Holdings LLC (RIHC), its top-tier BHC, as the Bank's IHC and the parent of RBC USA Holdco Corporation, the parent of most of the Bank's U.S. subsidiaries. Both RIHC and RBC USA Holdco Corporation are BHCs and FHCs. The Bank fulfills its Regulation YY regulatory requirements through RIHC, which include capital adequacy, capital planning and stress testing, risk management and governance, liquidity and liquidity stress testing, financial regulatory reporting and other requirements that are similar to, or the same as, those applicable to U.S. domestic BHCs that are similarly categorized under the rules that tailor enhanced prudential standards for FBOs and large U.S. banking organizations. In addition, the Bank is registered as a "Swap Dealer" with the U.S. Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA) and as a "Security-Based Swap Dealer" with the SEC.

The *USA PATRIOT Act* of 2001, as amended, which amended the *Bank Secrecy Act* of 1970, as amended (the Act), requires U.S. banks and certain other financial institutions with U.S. operations to maintain appropriate policies, procedures and controls reasonably designed to comply with the Act, including, as applicable, anti-money laundering compliance programs, suspicious activity and currency transaction reporting and other

obligations including due diligence on customers to prevent, detect and report individuals and entities involved in money laundering and the financing of terrorism. In January 2021, the *Anti-Money Laundering Act of 2020* (AMLA), which also amended the Act, was enacted. The AMLA is intended to comprehensively reform and modernize U.S. anti-money laundering laws. In September 2022, the U.S. Department of Treasury's Financial Crimes Enforcement Network (FinCEN) issued a final rule implementing the beneficial ownership information (BOI) reporting requirements under the Corporate Transparency Act, which was part of the AMLA. The BOI rule, which goes into effect January 1, 2024, implements sweeping beneficial owner disclosure requirements applicable to all U.S. companies and foreign companies doing business in the U.S., subject to certain exceptions. The BOI rule is the first of three related rulemakings. The remaining rulemakings will address (i) access to the BOI collected under a registry being developed by FinCEN; and (ii) required revisions to FinCEN's Customer Due Diligence rule. Several other provisions of the AMLA require additional rulemakings, reports and other measures.

The Bank maintains two branches in New York that are licensed and supervised as full federal branches with fiduciary licenses by the Office of the Comptroller of the Currency (OCC), the U.S. supervisor of national banks. In general, the Bank's branches may exercise the same rights and privileges, and are subject to the same restrictions, as would apply to a U.S. national bank at the same location(s). The Bank's branches may accept wholesale deposits, but may not take U.S. domestic retail deposits outside of an available exemption. Deposits in the Bank's branches are not insured by the Federal Deposit Insurance Corporation (FDIC). The Bank also maintains a limited federal branch in Jersey City, New Jersey which may exercise the same rights and privileges as the Bank's New York federal branches except that it generally can only take deposits from non-U.S. sources.

The OCC examines and supervises the Bank's U.S. branch office/agency's activities and operations. In addition, the Bank's U.S. branches are required to maintain a capital equivalency deposit in their state(s) of residence, which deposits are pledged to the OCC. Furthermore, the Bank's U.S. branch offices are subject to supervisory guidance based on the examiners' assessment of risk management, operational controls, compliance and asset quality.

The Bank also maintains a state-licensed agency in Texas and state-licensed representative offices in Delaware and Texas. In general, the activities conducted at the Bank's agency include a broad range of banking powers, including lending and maintaining credit balances, but agencies are limited in their ability to accept deposits from citizens or residents of the U.S. Further limitations may be placed on such agencies' activities based on state laws. RBC Investor Services Bank S.A, a Luxembourg bank, which is wholly owned by the Bank, also has a representative office in New York. The activities conducted at the representative offices are limited to representational and administrative functions; such representative offices do not have authority to make credit decisions and may not solicit or contract for any deposit or deposit-like liability. The representative offices are examined and assessed by both the Federal Reserve and state regulators and are required to adhere to any applicable state regulations.

Banking activities are also conducted at City National Bank (CNB) and RBC Bank (Georgia), National Association (RBC Bank), both of which are national banking associations chartered by the OCC. CNB and RBC Bank are members of the Federal Reserve. The OCC serves as the primary federal prudential regulator of CNB and RBC Bank. As U.S. banks, CNB and RBC Bank are allowed to take retail deposits, and they offer retail and commercial banking services, including deposit and credit services, such as consumer lending products (including credit card and mortgage loans), and business and commercial loans. CNB and RBC Bank are subject to capital requirements, dividend restrictions, limitations on investments and subsidiaries, limitations on transactions with affiliates (including the Bank and its branches), deposit reserve requirements and other requirements administered by the OCC and the Federal Reserve. Deposits at CNB and RBC Bank are FDIC-insured to the extent applicable. CNB and RBC Bank are also required to comply with applicable consumer protection laws and regulations such as those promulgated by the Consumer Financial Protection Bureau, an independent agency created under the *Dodd-Frank Act.* As an OCC chartered U.S. national bank, CNB also has fiduciary powers and offers trust and investment management services.

CNB also conducts trust and investment management activities through CNB's wholly-owned subsidiary, RBC Trust Company (Delaware) Limited (RBC Trust). RBC Trust is a Delaware trust company chartered and supervised by the Delaware State Banking Commission and, as a BHC subsidiary, is subject to oversight by the Federal Reserve. RBC Trust is subject to dividend restrictions, limitations on investments and other applicable state banking law requirements.

Broker-Dealer Activities and Broker-Dealer Subsidiaries

The principal securities brokerage, trading, advisory and investment banking activities are conducted by and through the following U.S.-registered broker-dealer subsidiaries:

- RBC Capital Markets, LLC (RBC CM LLC),
- RBC CMA LLC,
- City National Securities, Inc.,
- CNR Securities, LLC (formerly RIM Securities LLC), and
- Symphonic Securities LLC.

The SEC, state securities regulators, the Financial Industry Regulatory Authority and other self-regulatory organizations regulate these broker-dealer subsidiaries. Certain activities of RBC CM LLC and RBC CMA LLC are also subject to regulation by the CFTC and the NFA. Pursuant to the *Dodd-Frank Act*, RBC CM LLC is registered as a "Swaps Firm" with the NFA. Certain activities of RBC CM LLC are subject to regulation by the Municipal Securities Rulemaking Board.

Investment Management and Other Fiduciary Activities

The Bank's New York branches have fiduciary powers, under which these branches conduct investment management and custody activities for certain customers. In addition, other affiliates are involved in the business of investment management. In many cases, these activities require that the affiliates be registered with the SEC as investment advisers under the U.S. *Investment Advisers Act of 1940* , as amended (*Advisers Act*). The *Advisers Act* and related rules regulate the registration and activities of investment advisers. Although the regulatory regime for investment advisers is similar in some ways to that for broker-dealers, the standard of conduct is higher due to the advisers' status as fiduciaries.

The following entities are the Bank's subsidiaries that are registered as "investment advisers" with the SEC:

- RBC CM LLC,
- RBC Global Asset Management (U.S.) Inc. (GAM),
- RBC Global Asset Management (UK) Limited,
- RBC Private Counsel (USA) Inc.,
- BlueBay Asset Management LLP (BBAM),
- City National Rochdale, LLC (CNR),
- City National Securities, Inc., and
- Symphonic Financial Advisors LLC.

GAM and CNR also each sponsor and act as the adviser to U.S. mutual funds. The U.S. *Investment Company Act of 1940* , as amended, and related rules regulate the registration and operation of mutual funds and certain activities of the funds' advisers and other affiliates and certain of the funds' other service providers. Certain activities of BBAM and GAM are also subject to regulation by the CFTC and the NFA.

ERISA and the Internal Revenue Code

The U.S. *Employee Retirement Income Security Act* of 1974, as amended (ERISA), and its related rules regulate, among other things, the activities of the financial services industry with respect to pension plan clients. Similarly, the U.S. *Internal Revenue Code* and the regulations implemented thereunder impose requirements with respect to such clients and also individual retirement accounts (IRAs). Brokers, dealers

and investment advisers to pension plans and IRAs must conduct their business in compliance with both ERISA and applicable tax regulations.

Risk Factors

A discussion of risks affecting us and our businesses appears under the headings “Risk management”, “Transactional/positional risk drivers”, “Operational/regulatory compliance risk drivers”, “Strategic risk drivers”, “Macroeconomic risk drivers” and “Overview of other risks” from pages 58 to 104 of our 2022 Management’s Discussion and Analysis, which discussions are incorporated by reference herein.

Environmental and Social Policies

RBC is committed to transparent disclosure about our environmental and social (E&S) (including climate) commitments and objectives, and we report annually on related key performance metrics and targets. RBC initially launched its first corporate environmental risk policy in 1991. We have been a signatory to the Equator Principles since 2003. RBC Global Asset Management (RBC GAM)[3] and BlueBay Asset Management LLP have been signatories to the United Nations Principles for Responsible Investment (UN PRI) since 2015 and Brewin Dolphin Holdings Limited has been a signatory since 2019. In 2021, RBC became a member of the Net-Zero Banking Alliance (NZBA), a global, industry-led initiative to accelerate and support efforts to address climate change.[4] RBC Europe Limited, a wholly-owned subsidiary of the Bank, is a member of the Green Bond Principles, and RBC reports annually on its green bond underwriting activities, globally.

RBC is committed to publishing climate-related disclosures, at least annually, that are informed by the recommendations of the Financial Stability Board’s Task Force on Climate-related Financial Disclosures, and has voluntarily provided these since 2017. In 2022, the Board of Directors approved our updated RBC Climate Blueprint, which is our climate strategy, which included reflecting our NZBA commitment to achieve net-zero in our lending activities by 2050, and our increased financial pledge to RBC Tech for Nature (RBC’s multi-year commitment to accelerate tech-based sustainability solutions) to $100 million by 2025. We published our initial measurement of financed emissions in March 2022[4] using the Partnership for Carbon Accounting Financials[5] methodology for financed emissions, and published initial interim emissions reduction targets for the oil and gas, power generation and automotive sectors in October 2022[4] [6].

Also in October 2022, RBC published its approach and methodology for classifying, tracking and disclosing progress towards our commitment made in 2021 to provide $500 billion in sustainable finance[7] by 2025. We have a Human Rights Position Statement and we are undertaking human rights salience assessments to better understand the ways in which our business activities could potentially impact the human rights of our stakeholders. We also publish our annual Modern Slavery Act Statement approved by the Governance

---

3 RBC GAM includes the following affiliates: BlueBay Asset Management LLP (BlueBay), RBC Global Asset Management Inc. (including Phillips, Hager & North Investment Management), RBC Global Asset Management (U.S.) Inc., RBC Global Asset Management (UK) Limited, and RBC Global Asset Management (Asia) Limited, which are separate, but affiliated subsidiaries of RBC.

4 Our NZBA commitment, our initial measurement of financed emissions and our initial interim emissions reduction targets exclude the practices of: (a) RBC GAM and RBC Wealth Management. RBC Wealth Management includes the following affiliates: RBC Dominion Securities Inc. (Member–Canadian Investor Protection Fund), RBC Direct Investing Inc. (Member–Canadian Investor Protection Fund), Royal Mutual Funds Inc., RBC Wealth Management Financial Services Inc., Royal Trust Corporation of Canada and The Royal Trust Company, which are separate but affiliated subsidiaries of RBC; and (b) Brewin Dolphin Holdings PLC and its subsidiaries.

5 Partnership for Carbon Accounting Financials (PCAF) is an industry-led partnership to facilitate transparency and enable financial institutions to assess and disclose greenhouse gas emissions of loans and investments. RBC joined PCAF in 2021.

6 We may revise our initial interim emissions reduction targets as appropriate, to support their alignment with evolving economic realities, market practice and current climate science. Refer to the Caution regarding forward-looking statements.

7 Sustainable finance refers to financial activities that take into account environmental, social and governance factors.

Committee of the Board of Directors which sets out the steps that we have taken that are designed to prevent slavery and human trafficking from taking place in our business or supply chains.

RBC maintains environmental and social risk management (ESRM) policies and procedures designed to identify, assess, measure, manage, mitigate, monitor and report the environmental and social risks associated with our activities. These policies and procedures focus on environmental and social risk issues, including site contamination, waste management, land and resource use, biodiversity, water quality and availability, climate change, environmental regulation, human rights (including, but not limited to, social and racial inequality and Indigenous Peoples' rights), and community engagement.

We proactively review and update our ESRM policies and procedures to address regulatory changes, emerging and evolving issues, and international best practices. In 2022, we updated our primary enterprise-wide environmental and social risk policy, our Enterprise Policy on Environmental (including Climate) and Social Risk, to align with our E&S goals, commitments and objectives, as well as the strategic choices we are making towards achieving them. We have policy guidelines in place for sensitive sectors and activities, which address RBC's financing activities to clients and projects operating in the coal-fired power and coal mining sectors, the Arctic ecosystem, the Arctic National Wildlife Refuge, and United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites. Our business segments and functional groups are responsible for incorporating E&S risk management requirements within their business and / or operations as applicable.

Additional information about our environmental and social risk policies, including information about factors that could materially adversely affect our ability to achieve our climate and sustainable-finance commitments, goals and targets, can be found under "Overview of other risks – Environmental and social risk (including climate change)" on page 101 of our 2022 Management's Discussion and Analysis, which section is incorporated by reference herein.

DESCRIPTION OF CAPITAL STRUCTURE

General Description

The Bank's authorized share capital consists of an unlimited number of common shares without nominal or par value and an unlimited number of first preferred shares and second preferred shares without nominal or par value, issuable in series, which classes may be issued for a maximum consideration of $20 billion and $5 billion, respectively. The following summary of share capital is qualified in its entirety by the Bank's by-laws and the actual terms and conditions of such shares.

Common Shares

The holders of the Bank's common shares are entitled to vote at all meetings of shareholders, except meetings at which only holders of a specified class, other than common shares, or series of shares are entitled to vote. The holders of common shares are entitled to receive dividends as and when declared by the board of directors, subject to the preference of the preferred shares. After payment to the holders of the preferred shares of the amount or amounts to which they may be entitled, and after payment of all outstanding debts, the holders of the common shares will be entitled to receive any remaining property upon liquidation, dissolution or winding-up.

Preferred Shares

First preferred shares may be issued, from time to time, in one or more series with such rights, privileges, restrictions and conditions as the board of directors may determine, subject to the *Bank Act* and to the Bank's by-laws. The first preferred shares are entitled to preference over any second preferred shares (discussed below) and common shares and over any other shares ranking junior to the first preferred shares with respect

to the payment of dividends and in the distribution of property in the event of liquidation, dissolution or winding-up.

As at November 29, 2022, Non-Cumulative First Preferred Shares Series AZ, BB, BD, BF, BH, BI, BO, BQ, BR, BS, BT and C-2 are outstanding. The Non-Cumulative First Preferred Shares Series AZ, BB, BD, BF, BH, BI and BO are listed on the Toronto Stock Exchange, while the Bank's Depositary Shares representing interests in the Non-Cumulative First Preferred Shares Series C-2 (the Series C-2 Preferred Shares) are listed on the New York Stock Exchange. The Non-Cumulative First Preferred Shares Series BQ, BR, BS and BT are not listed on an exchange. On February 24, 2022, we redeemed all of our issued and outstanding Non-Cumulative First Preferred Shares Series BJ.

Effective January 1, 2013, in accordance with capital adequacy requirements adopted by OSFI, non-common capital instruments issued after January 1, 2013, including first preferred shares, must include terms providing for the full and permanent conversion of such securities into common shares upon the occurrence of certain trigger events relating to financial viability (the Non-Viability Contingent Capital requirements) in order to qualify as regulatory capital. As of January 1, 2013, all outstanding capital instruments that do not meet the Non-Viability Contingent Capital requirements are considered non-qualifying capital instruments and are to be phased out beginning January 1, 2013 at the rate of 10 per cent each year for 10 years. The Non-Cumulative First Preferred Shares Series AZ, BB, BD, BF, BH, BI, BO, BQ, BR, BS and BT contain non-viability contingent capital provisions necessary to qualify as Tier 1 regulatory capital under Basel III and are therefore convertible into common shares upon the occurrence of a non-viability contingent capital trigger event.

We are prohibited by the *Bank Act* from declaring or paying any dividends on our preferred or common shares when we are, or would be placed as a result of the declaration, in contravention of the capital adequacy and liquidity regulations or any regulatory directives issued under the *Bank Act*. We may not pay dividends on our common shares or redeem, purchase or otherwise retire common shares or preferred shares at any time without the approval of the holders of outstanding first preferred shares unless all dividends to which first preferred shareholders are then entitled have been declared and paid or set apart for payment.

The Non-Cumulative First Preferred Shares Series BT were issued on November 5, 2021 to certain institutional investors.

The Non-Cumulative First Preferred Shares Series BQ, BR and BS (the LRCN Preferred Shares) were respectively issued on July 28, 2020, November 2, 2020 and June 8, 2021 in connection with the Bank's concurrent issuances of Limited Recourse Capital Notes (the LRCNs). The LRCN Preferred Shares are held by Computershare Trust Company of Canada as trustee (the Trustee) for Leo LRCN Limited Recourse Trust™ (the Limited Recourse Trust). In certain circumstances, including non-payment of interest on, principal of or redemption price for the LRCNs when due, or the occurrence of an event of default or a non-viability contingent capital trigger event, the Trustee of the Limited Recourse Trust will deliver to holders of LRCNs their proportionate share of the Limited Recourse Trust's assets, which will consist of the LRCN Preferred Shares except in limited circumstances, in full satisfaction of the Bank's obligations under the LRCNs.

For so long as the LRCN Preferred Shares are held by the Trustee on behalf of the Limited Recourse Trust, such shares will not be entitled to receive dividends.

On November 2, 2015, in connection with the merger of CNB with and into RBC USA Holdco Corporation, the Bank issued Non-Cumulative First Preferred Shares Series C-1 and C-2 in exchange for two series of outstanding CNB preferred stock. Currently, only the Series C-2 Preferred Shares remain outstanding.

In the event the Bank fails to pay, declare, or set aside for payment, dividends on any of the Series C-2 Preferred Shares or any other series of preferred shares of the Bank for six quarterly dividend periods, or their equivalent, whether or not consecutive, the number of directors of the board of directors shall be

increased by two at the Bank's first annual meeting of shareholders held thereafter. The holders of the Series C-2 Preferred Shares shall have the right, together with holders of any shares that, by their terms, expressly provide that they rank *pari passu* with the Series C-2 Preferred Shares (together, the Series C-2 Parity Shares) and that have similar voting rights, if any, to elect, as a class together, such additional two members to the Bank's board of directors for a term of one year. Upon the payment, or the declaration and setting aside for payment, in full, of all the cumulative dividends payable for all past dividend periods and continuous noncumulative dividends for at least one year on all outstanding preferred shares of the Bank, the terms of such two directors shall terminate, the number of directors of the Bank's board of directors shall be reduced by two and the voting rights of the holders of the Series C-2 Preferred Shares and the Series C-2 Parity Shares shall cease (subject to the revesting of such voting rights in the event of each and every additional failure in the payment of dividends for six quarterly dividend periods).

Second preferred shares may be issued, from time to time, in one or more series with such rights, privileges, restrictions and conditions as the board of directors may determine, subject to the *Bank Act* and to the Bank's by-laws. There are no second preferred shares currently outstanding. Second preferred shares would rank junior to the first preferred shares. Second preferred shares would be entitled to preference over the common shares and over any other shares ranking junior to the second preferred shares with respect to the payment of dividends and in the distribution of property in the event of our liquidation, dissolution or winding-up.

Except as outlined above with respect to the Series C-2 Preferred Shares and the Series C-2 Parity Shares, holders of the first and second preferred shares are not entitled to any voting rights as a class except as provided under the *Bank Act* or the Bank's by-laws. Under the *Bank Act*, the Bank may not create any other class of shares ranking equal with or superior to a particular class of preferred shares, increase the authorized number of, or amend the rights, privileges, restrictions or conditions attaching to such class of preferred shares, without the approval of the holders of that class of preferred shares.

Any approval to be given by the holders of the first and second preferred shares may be given in writing by the holders of not less than all of the outstanding preferred shares of each class or by a resolution carried by the affirmative vote of not less than 66⅔ per cent of the votes cast at a meeting of holders of each class of preferred shares at which a quorum is represented. A quorum at any meeting of holders of each class of preferred shares is 51 per cent of the shares entitled to vote at such meeting, except that at an adjourned meeting there is no quorum requirement.

Additional information about the Bank's share capital can be found under "Capital management" beginning on page 105 of our 2022 Management's Discussion and Analysis, which section is incorporated by reference herein.

Prior Sales

For information about the Bank's issuances of subordinated debentures since October 31, 2021, see the "Capital management" section beginning on page 105 of our 2022 Management's Discussion and Analysis and Note 19 "Subordinated debentures" beginning on page 209 of our 2022 Annual Consolidated Financial Statements, which section and note are incorporated by reference herein. For information about the Bank's issuances of Limited Recourse Capital Notes since October 31, 2021, see the "Capital management" section beginning on page 105 of our 2022 Management's Discussion and Analysis and Note 20 "Equity" beginning on page 210 of our 2022 Annual Consolidated Financial Statements, which section and note are incorporated by reference herein.

Constraints

The *Bank Act* contains restrictions on the issue, transfer, acquisition, beneficial ownership and voting of shares of a chartered bank. The following is a summary of several key restrictions.

Subject to certain exceptions contained in the *Bank Act*, no person may be a major shareholder of a bank having equity of $12 billion or more (which includes the Bank). A person is a major shareholder if:

(a) the aggregate of the shares of any class of voting shares of the Bank beneficially owned by that person, by entities controlled by that person and by any person associated or acting jointly or in concert with that person is more than 20 per cent of the outstanding shares of that class of voting shares, or
(b) the aggregate of shares of any class of non-voting shares of the Bank beneficially owned by that person, by entities controlled by that person and by any person associated or acting jointly or in concert with that person is more than 30 per cent of the outstanding share of that class of non-voting shares.

Additionally, no person may have a significant interest in any class of shares of a bank (including the Bank) unless the person first receives the approval of the Minister. For purposes of the *Bank Act*, a person has a significant interest in a class of shares of a bank where the aggregate of any shares of the class beneficially owned by that person, by entities controlled by that person and by any person associated or acting jointly or in concert with that person exceeds 10 per cent of all of the outstanding shares of that class of shares of such bank.

The *Bank Act* also prohibits a bank from purchasing or redeeming any of its shares or paying any dividends if there are reasonable grounds for believing the bank is, or the payment would cause the bank to be, in contravention of the *Bank Act* requirement to maintain, in relation to its operations, adequate capital and appropriate forms of liquidity and to comply with any regulations or directions of the Superintendent in relation thereto. Under the *Bank Act*, the Bank cannot redeem or purchase any shares for cancellation unless the prior consent of the Superintendent has been obtained.

Subject to certain exceptions, the *Bank Act* also prohibits the registration of a transfer or issue of any shares of a Canadian bank to any government or government agency of Canada or any province of Canada, or to any government of any foreign country, or any political subdivision, or agency of any foreign country.

Ratings

Our ability to access unsecured funding markets and to engage in certain collateralized business activities on a cost-effective basis is primarily dependent upon maintaining competitive credit ratings. Credit ratings and outlooks provided by rating agencies reflect their views and methodologies. Our credit ratings are largely determined by the rating agencies' assessment of the quality of our earnings, the adequacy of our capital and the effectiveness of our risk management programs. Ratings are subject to change, based on a number of factors including, but not limited to, our financial strength, competitive position, liquidity and other factors not completely within our control. There can be no assurance that our credit ratings and rating outlooks will not be lowered or that rating agencies will not issue adverse commentaries about us, potentially resulting in adverse consequences for our funding capacity or access to capital markets.

A lowering of our credit ratings may also affect our ability, and the cost, to enter into normal course derivative or hedging transactions and may require us to post additional collateral under certain contracts. However, we estimate, based on periodic reviews of ratings triggers embedded in our existing businesses and of our funding capacity sensitivity, that a minor downgrade would not materially influence our liability composition, funding access, collateral usage and associated costs.

As at November 29, 2022, RBC had the following solicited ratings from the rating agencies listed below:

	RATING CLASS*	RATING	RANK**
Moody's Investors Service	Legacy Senior Long-term Debt[1]	Aa1	2 of 21
	Senior Long-term Debt[2]	A1	5 of 21
	Short-term Debt	P-1	1 of 4
	Subordinated Debt	A3	7 of 21
	NVCC Subordinated Debt	A3 (hyb)	7 of 21
	Preferred Shares	Baa2	9 of 21
	NVCC Preferred Shares	Baa2 (hyb)	9 of 21
	Outlook – Stable[3]		
Standard & Poor's	Legacy Senior Long-term Debt[1]	AA-	4 of 22
	Senior Long-term Debt[2]	A	6 of 22
	Short-term Debt	A-1+	1 of 7
	Subordinated Debt	A	6 of 22
	NVCC Subordinated Debt	A-	7 of 22
	Preferred Shares	BBB+	8 of 22
	NVCC Preferred Shares	BBB	9 of 22
	Outlook – Stable		
Fitch Ratings	Legacy Senior Long-term Debt[1]	AA	3 of 23
	Senior Long-term Debt[2]	AA-	4 of 23
	Short-term Debt	F1+	1 of 8
	Subordinated Debt	A	6 of 23
	NVCC Subordinated Debt	A	6 of 23
	Preferred Shares	BBB+	8 of 23
	NVCC Preferred Shares	BBB+	8 of 23
	Outlook – Stable		
DBRS	Legacy Senior Long-term Debt[1]	AA (high)	2 of 26
	Senior Long-term Debt[2]	AA	3 of 26
	Short-term Debt	R-1 (high)	1 of 10
	Subordinated Debt	AA (low)	4 of 26
	NVCC Subordinated Debt	A	6 of 26
	Preferred Shares	Pfd-1 (low)	3 of 16
	NVCC Preferred Shares	Pfd-2 (high)	4 of 16
	Outlook – Stable		

* Our rating classes may differ from the rating category nomenclatures used by the rating agencies.
** Relative rank of each rating within the organization's overall classification system.
1 Includes senior long-term debt issued prior to September 23, 2018 and senior long-term debt issued on or after September 23, 2018, which is excluded from the Bail-in Regime.
2 Includes senior long-term debt issued on or after September 23, 2018 which is subject to conversion under the Bail-in Regime.
3 On October 7, 2021, Moody's placed our long-term senior debt, subordinated debt and preferred share ratings and assessments on review for upgrade. Our short-term debt ratings were affirmed.

A definition of the categories of each rating as at November 29, 2022 has been obtained from the respective rating agency's website and is outlined in Appendix B, and a more detailed explanation may be obtained from the applicable rating agency.

On December 10, 2021, Fitch Ratings assigned a BBB+ rating to our preferred shares. On July 11, 2022, Fitch Ratings affirmed our ratings with a stable outlook.

On May 13, 2022, DBRS affirmed our ratings with a stable outlook.

On May 13, 2022, Standard & Poor's affirmed our ratings with a stable outlook.

On January 27, 2022, Moody's upgraded our long-term debt ratings and assessments, as well as affirmed our short-term debt ratings. Following this rating action, our outlook is stable. This rating action concludes the review for upgrade initiated by Moody's on October 7, 2021.

Credit ratings, including stability or provisional ratings (collectively, Ratings) are not recommendations to purchase, sell or hold a financial obligation inasmuch as they do not comment on market price or suitability for a particular investor. Ratings may not reflect the potential impact of all risks on the value of securities. In addition, real or anticipated changes in the rating assigned to a security will generally affect the market value of that security. Ratings are determined by the rating agencies based on criteria established from time to time by them and are subject to revision or withdrawal at any time by the rating organization. Each Rating listed in the table above should be evaluated independently of any other Rating applicable to our debt and

preferred shares. As is customary, RBC pays rating agencies to assign Ratings for the parent company as well as our subsidiaries, and for certain other services.

Additional information about Ratings is provided under “Transactional/positional risk drivers – Liquidity and funding risk – Credit ratings” on page 87 of our 2022 Management’s Discussion and Analysis, which section is incorporated by reference herein.

MARKET FOR SECURITIES

Trading Price and Volume

The Bank’s common shares are listed on the Toronto Stock Exchange (TSX) in Canada, the New York Stock Exchange (NYSE) in the U.S and the SIX Swiss Exchange (SIX) in Switzerland. The Bank’s Non-Cumulative First Preferred Shares Series AZ, BB, BD, BF, BH, BI and BO are listed on the TSX. The Bank’s Depositary Shares (representing interests in the Series C-2 Preferred Shares) are listed on the NYSE.

The following table sets out the price range and trading volumes of the common shares on the TSX and the US Composite for the periods indicated. Prices are based on the reported amounts from the TSX Historical Data Access (TSX HDA) and NYSE Connect.

	Common Shares (TSX)			Common Shares (NYSE)		
Month	**High ($)**	**Low ($)**	**Volume**	**High (US$)**	**Low (US$)**	**Volume**
November 2021	133.68	126.17	71,460,080	107.00	98.76	27,338,249
December 2021	135.34	125.64	59,289,520	106.37	98.00	30,960,010
January 2022	149.59	135.63	113,485,656	119.40	106.41	38,309,641
February 2022	148.26	135.38	68,708,409	116.84	105.50	28,563,021
March 2022	144.15	134.49	76,300,700	114.55	104.28	24,743,784
April 2022	140.75	129.01	97,155,552	112.67	100.44	19,753,932
May 2022	132.83	124.22	71,044,743	104.94	95.02	22,008,664
June 2022	133.55	122.36	61,905,316	106.41	94.23	19,135,310
July 2022	128.76	118.24	102,983,347	99.15	90.75	21,279,155
August 2022	129.95	121.81	73,677,528	100.98	93.04	15,013,189
September 2022	129.41	120.28	54,935,945	99.77	89.20	14,992,918
October 2022	129.23	116.75	106,895,031	95.51	83.63	20,106,548

The following tables provide the price range and trading volumes of the first preferred shares on the TSX for the periods indicated. [8] Prices are based on the reported amounts from the TSX HDA.

	Series AZ			Series BB			Series BD		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2021	24.70	24.36	316,613	24.73	24.40	470,488	25.04	24.80	407,183
December 2021	24.50	23.90	223,136	24.55	23.95	166,409	25.00	24.21	300,550
January 2022	24.67	24.07	119,240	24.66	23.90	122,062	25.40	24.42	171,514
February 2022	24.25	22.89	559,140	24.11	22.87	106,491	24.85	24.10	542,050
March 2022	23.40	22.40	201,898	23,25	22,48	299,718	24.82	23.30	208,329
April 2022	23.24	20.06	127,403	22.85	20.00	369,771	23.87	21.05	206,314
May 2022	22.45	20.53	168,279	22.41	20.75	232,888	23.51	21.25	195,112
June 2022	22.70	20.64	98,228	22.78	20.65	165,521	23.19	21.00	418,720
July 2022	21.87	20.06	167,545	21.57	20.36	175,411	21.96	20.89	147,236
August 2022	22.86	21.46	134,239	22.30	21.60	82,697	22.83	21.50	86,301
September 2022	22.00	19.80	136,316	21.80	19.67	94,910	22.50	20.40	93,707
October 2022	19.69	18.60	183,171	19.82	18.71	154,630	21.05	19.23	177,084

	Series BF			Series BH			Series BI		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2021	24.79	24.43	71,102	26.20	25.75	55,790	26.25	25.69	68,276
December 2021	24.63	23.90	88,197	26.20	25.75	21,166	26.30	25.80	26,959
January 2022	24.80	24.08	127,439	26.21	25.61	23,072	26.25	25.55	44,943
February 2022	24.35	23.73	235,685	25.90	25.51	39,884	25.94	25.50	65,739
March 2022	24.03	22.84	233,575	26.08	24.96	107,408	25.90	24.65	92,553
April 2022	23.22	20.22	164,862	25.25	22.49	80,629	25.24	22.75	106,199
May 2022	22.70	20.65	61,542	24.57	23.71	54,661	24.55	23.56	38,237
June 2022	22.69	20.21	80,529	24.86	23.46	43,516	24.90	23.33	31,119
July 2022	21.20	20.26	341,167	24.01	23.10	31,169	24.40	22.97	39,803
August 2022	21.88	20.91	143,005	24.30	23.68	14,710	24.40	23.40	31,265
September 2022	21.50	19.64	154,349	23.99	21.35	36,487	24.00	21.43	49,682
October 2022	20.48	18.62	109,757	21.60	19.31	244,244	21.68	19.25	234,675

	Series BJ			Series BO		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)24.910**	**Volume**
November 2021	26.75	26.38	19,674	25.55	25.20	167,955
December 2021	26.49	25.91	52,408	25.60	24.96	137,425
January 2022	26.83	25.73	139,062	25.75	24.91	160,397
February 2022	25.76	25.73	81,326	25.48	24.73	254,626
March 2022	-	-	-	25.49	24.75	382,316
April 2022	-	-	-	25.03	22.71	174,531
May 2022	-	-	-	24.98	23.41	170,987
June 2022	-	-	-	25.00	23.59	82,258
July 2022	-	-	-	24.45	23.40	126,179
August 2022	-	-	-	24.58	23.82	76,232
September 2022	-	-	-	24.28	22.00	116,816
October 2022	-	-	-	22.12	20.75	123,325

8 On February 24, 2022, we redeemed all of our issued and outstanding Non-Cumulative First Preferred Shares Series BJ.

The following table provides the price range and trading volumes of the Depositary Shares on the NYSE for the period indicated. Prices are based on the reported amounts from NYSE Connect.

	Series C-2		
Month	**High (US$)**	**Low (US$)**	**Volume**
November 2021	28.31	27.91	3,340
December 2021	28.44	26.38	70,579
January 2022	27.48	26.75	18,080
February 2022	28.11	26.46	18,744
March 2022	27.12	26.58	6,754
April 2022	27.80	27.00	8,197
May 2022	27.30	26.20	6,877
June 2022	27.41	26.51	4,352
July 2022	28.05	26.70	4,808
August 2022	28.17	25.44	12,624
September 2022	26.17	25.43	12,744
October 2022	25.74	25.01	83,678

DIVIDENDS

The Bank has had an uninterrupted history of paying dividends on its common shares and on each of its outstanding series of first preferred shares. Information about the Bank's dividends paid or payable per share on the common shares and each outstanding series of first preferred shares in each of the two most recently completed years appears under the heading "Selected capital management activity" in the "Capital management" section beginning on page 111 of our 2022 Management's Discussion and Analysis, which section is incorporated by reference herein. Information about restrictions on the payment of dividends appears under the heading "Restrictions on the payment of dividends" in Note 20 "Equity" on page 212 of our 2022 Annual Consolidated Financial Statements, which note is incorporated by reference herein.

The declaration amount and payment of future dividends will be subject to the discretion of the Bank's board of directors, and will be dependent upon the Bank's results of operations, financial condition, cash requirements and future regulatory restrictions on the payment of dividends and other factors deemed relevant by the board of directors.

Information about our dividends and our dividend payout ratio (common share dividends as a percentage of net income less preferred share dividends) is provided under the heading "Selected capital management activity" in the "Capital management" section beginning on page 111 of our 2022 Management's Discussion and Analysis and in Note 20 "Equity" beginning on page 210 of our 2022 Annual Consolidated Financial Statements, which section and note are incorporated by reference herein.

SECURITIES SUBJECT TO CONTRACTUAL RESTRICTION ON TRANSFER

In connection with each issuance of LRCNs, the Bank also concurrently issues first preferred shares. These LRCN Preferred Shares are held in the Limited Recourse Trust. Pursuant to the Amended and Restated Declaration of Trust for the Limited Recourse Trust and the share provisions for the LRCN Preferred Shares, the Trustee of the Limited Recourse Trust will only deliver the LRCN Preferred Shares to holders of LRCNs under certain prescribed circumstances further described herein under "Description of Capital Structure – Preferred Shares".

Securities Subject to Contractual Restriction on Transfer as at November 29, 2022

Designation of Class	Number of Securities that are Subject to a Contractual Restriction on Transfer	Percentage of Class
First Preferred Shares	1,750,000 Non-Cumulative First Preferred Shares Series BQ 1,250,000 Non-Cumulative First Preferred Shares Series BR 1,000,000 Non-Cumulative First Preferred Shares Series BS	3.75%

DIRECTORS AND EXECUTIVE OFFICERS

Directors

The following are the Bank's directors as at November 29, 2022:

Name and Year Elected	Province/State and Country of Residence	Occupation
Mirko Bibic (2022)	Ontario, CAN	President and Chief Executive Officer, BCE Inc. and Bell Canada
Andrew A. Chisholm (2016)	Ontario, CAN	Corporate Director
Jacynthe Côté (2014)	Quebec, CAN	Chair of the Board, Hydro-Quebec
Toos N. Daruvala (2015)	New York, U.S.	Corporate Director
David F. Denison (2012)	Ontario, CAN	Chair of the Board, Element Fleet Management Corp.
Cynthia Devine (2020)	Ontario, CAN	Interim President and Chief Executive Officer, Maple Leaf Sports and Entertainment
Roberta L. Jamieson (2021)	Ontario, CAN	Corporate Director
David I. McKay (2014)	Ontario, CAN	President and Chief Executive Officer, Royal Bank of Canada
Kathleen P. Taylor (2001)	Ontario, CAN	Chair of the Board, Royal Bank of Canada
Maryann Turcke (2020)	Ontario, CAN	Corporate Director
Thierry Vandal (2015)	New York, U.S.	President, Axium Infrastructure US Inc.
Bridget A. van Kralingen (2011)	New Jersey, U.S.	Corporate Director
Frank Vettese (2019)	Ontario, CAN	Co-Founder, SummitNorth Advisory Corp.
Jeffery Yabuki (2017)	Nevada, U.S.	Chairman, Sportradar AG and Chairman, Motive Partners GP, LLC

Directors are elected annually and hold office until the next annual meeting of shareholders. Since November 1, 2017, the directors have held the principal occupations described above, except for the following:

Mr. Mirko Bibic served in a variety of leadership positions since joining BCE Inc. in 2004, including Chief Operating Officer from 2018 through 2020 and Executive Vice President, Corporate Development and Chief Legal and Regulatory Officer from 2012 to 2018.

Mr. Toos N. Daruvala was Co-Chief Executive Officer, MIO Partners, Inc. from November 2016 through March 2021.

Ms. Cynthia Devine was Executive Vice President, Chief Financial Officer and Corporate Secretary, RioCan Real Estate Investment Trust from March 2015 through March 2017.

Ms. Roberta L. Jamieson was President and Chief Executive Officer of Indspire (a Canadian Indigenous charity that invests in the education of First Nations, Inuit and Métis people) from November 2004 through December 2020.

Ms. Maryann Turcke was Senior Advisor, Brookfield Infrastructure Partners L.P. from September 2020 through September 2022, Senior Advisor, National Football League from September 2020 through 2021, Chief Operating Officer, National Football League from April 2017 through September 2020 and President, Bell Media from April 2015 through February2017.

Ms. Bridget van Kralingen served in a variety of leadership positions since joining IBM Corporation in 2004 until her retirement as Senior Vice-President of Special Projects in December 2021. She has also served as Senior Vice-President of Global Markets, Senior Vice-President of Global Industries, Platform and Blockchain, Senior Vice-President of IBM Global Business Services and General Manager of IBM North America.

Mr. Frank Vettese served in a variety of leadership positions since joining Deloitte Canada in 2002, most recently as Managing Partner and Chief Executive from 2012 through June 2019.

Mr. Jeffery Yabuki was Executive Chairman, Fiserv, Inc. from June through December 2020 and Chief Executive Officer, Fiserv, Inc. from 2005 through June 2020.

Committees of the Board

Audit Committee: F. Vettese (Chair), T.N Daruvala, C. Devine, M. Turcke, B.A. van Kralingen and J. Yabuki.

Risk Committee: A.A. Chisholm (Chair), M. Bibic, J. Côté, D.F. Denison, R.L. Jamieson and T. Vandal.

Governance Committee: J. Côté (Chair), M. Bibic, A.A. Chisholm, D.F. Denison, C. Devine and R.L. Jamieson.

Human Resources Committee: T. Vandal (Chair), T.N. Daruvala, M. Turcke, B.A. van Kralingen, F. Vettese and J. Yabuki.

Executive Officers

The following are the Bank's executive officers as at November 29, 2022:

Name	Province/State and Country of Residence	Title
Nadine Ahn	Ontario, CAN	Chief Financial Officer
Maria Douvas	New York, U.S.A.	Chief Legal Officer
Douglas Guzman	Ontario, CAN	Group Head, RBC Wealth Management, RBC Insurance and RBC Investor & Treasury Services
Graeme Hepworth	Ontario, CAN	Chief Risk Officer
Christoph Knoess	New York, U.S.A.	Chief Administrative & Strategy Officer
David I. McKay	Ontario, CAN	President & Chief Executive Officer
Neil McLaughlin	Ontario, CAN	Group Head, Personal & Commercial Banking
Derek Neldner	Ontario, CAN	CEO and Group Head, RBC Capital Markets
Kelly Pereira	Ontario, CAN	Chief Human Resources Officer
Bruce Ross	Ontario, CAN	Group Head, Technology and Operations

Since November 1, 2017, the executive officers have held the positions described below:

Ms. Nadine Ahn was appointed to Group Executive in her role as Chief Financial Officer effective November 1, 2021. Prior to her current role, Ms. Ahn was Senior Vice President, Wholesale Finance & Investor Relations since March 2019 and Senior Vice President, CFO Wholesale Finance since June 2016 and Vice President & Controller, Global Head of Financial Control, Capital Markets Finance since 2014.

Ms. Maria Douvas was appointed to the Group Executive in her role as Chief Legal Officer effective September 17, 2021. Prior to her current role, Ms. Douvas was Executive Vice President and General Counsel since February 2021, Senior Vice President, U.S. General Counsel and Global Head of Litigation since September 2018 and Vice President and Global Head of Litigation and Employment Law since April 2016.

Mr. Douglas Guzman was appointed to Group Executive in his role as Group Head, RBC Wealth Management & Insurance effective November 1, 2015 and assumed leadership of RBC Investor & Treasury Services effective November 1, 2019. Prior to his current role, Mr. Guzman was Managing Director and Head Global Investment Banking, Capital Markets since 2006.

Mr. Graeme Hepworth was appointed to Group Executive in his role as Chief Risk Officer of Royal Bank of Canada effective April 9, 2018. Prior to his current role, Mr. Hepworth was Executive Vice President, Group Risk Management, Retail and Commercial Risk since 2017, Senior Vice President, Group Risk Management, Personal & Commercial Banking since 2015.

Mr. Christoph Knoess was appointed to the Group Executive in his role as Chief Administrative Officer effective December 2, 2019. Prior to joining RBC, Mr. Knoess was a Partner in Digital, Technology and Organizational Agility in Banking at McKinsey & Company since 2017 and prior to that he was a Partner and Global Head of the Digital, Technology and Analytics Practice at Oliver Wyman since 2008.

Mr. David I. McKay was appointed President of Royal Bank of Canada effective in February 2014 and Chief Executive Officer effective in August 2014. Mr. McKay was appointed to Group Executive in his role as Group Head, Canadian Banking in April 2008 and was appointed Group Head, Personal & Commercial Banking effective October 31, 2012.

Mr. Neil McLaughlin was appointed to Group Executive in his role as Group Head, Personal & Commercial Banking effective May 2017. In September 2021, Mr. McLaughlin also assumed responsibility for RBC Ventures. Prior to his current role, Mr. McLaughlin was Executive Vice President, Business Financial Services, Personal & Commercial Banking since October 2014.

Mr. Derek Neldner was appointed to the Group Executive in his role as Group Head and CEO, Capital Markets effective November 1, 2019. Prior to his current role, Mr. Neldner was Global Head of Investment Banking since June 2018, and Head, Canadian and Asia Pacific Banking since June 2014.

Ms. Kelly Pereira was appointed to Group Executive in her role as Chief Human Resources Officer effective June 1, 2022. Prior to her current role, Ms. Pereira was Senior Vice President, Talent Strategy and Solutions since June 2020, and Senior Vice President Leadership Development and Reimagine HR since July 2017.

Mr. Bruce Ross was appointed to Group Executive in his role as Group Head, Technology and Operations effective in January 2014. Prior to joining RBC, Mr. Ross was with IBM, holding a series of progressively more senior positions.

Ownership of Securities

To our knowledge, as at October 31, 2022, the directors and executive officers, as a group, beneficially own or exercise control or direction over less than one per cent (1%) of our common and preferred shares. None of our directors or executive officers holds shares of our subsidiaries except where required for qualification as a director of a subsidiary.

Cease Trade Orders, Bankruptcies, Penalties or Sanctions

To the best of our knowledge, no director or executive officer,

(a) is, as at November 29, 2022 or has been, within the 10 years before, a director, chief executive officer or chief financial officer of any company (including our company), that while that person was acting in that capacity,

  (i) was the subject of a cease trade or similar order or an order that denied the relevant company access to any exemption under Canadian securities legislation,[9] for a period of more than 30 consecutive days, or

  (ii) was subject to an event that resulted, after the director or executive officer ceased to be a director, chief executive officer or chief financial officer, in the company being the subject of a cease trade or similar order or an order that denied the relevant company access to any exemption under Canadian securities legislation,[9] for a period of more than 30 consecutive days, or

(b) is, as at November 29, 2022 or has been, within the 10 years before, a director or executive officer of any company (including our company), that while that person was acting in that capacity or within a year of that person ceasing to act in that capacity, became bankrupt, made a proposal under any

[9] National Instrument 14-101 restricts the meaning of “securities legislation” to Canadian provincial and territorial legislation and “securities regulatory authority” to Canadian provincial and territorial securities regulatory authorities.

legislation relating to bankruptcy or insolvency or was subject to or instituted any proceedings, arrangement or compromise with creditors or had a receiver, receiver manager or trustee appointed to hold its assets, or

(c) has, within the 10 years before November 29, 2022, become bankrupt, made a proposal under any legislation relating to bankruptcy or insolvency, or become subject to or instituted any proceedings, arrangement or compromise with creditors, or had a receiver, receiver manager or trustee appointed to hold the assets of the director or executive officer.

To the best of our knowledge, none of our directors or executive officers have been subject to (a) any penalties or sanctions imposed by a court relating to Canadian securities legislation[10] or by a Canadian securities regulatory authority [10] or has entered into a settlement agreement with a Canadian securities regulatory authority,[10] or (b) any other penalties or sanctions imposed by a court or regulatory body that would likely be considered important to a reasonable investor in making an investment decision.

Conflicts of Interest

To the best of our knowledge, no director or executive officer has an existing or potential material conflict of interest with us or any of our subsidiaries.

LEGAL PROCEEDINGS AND REGULATORY ACTIONS

In the ordinary course of our business, we are routinely involved in or parties to various ongoing, pending and threatened legal actions and proceedings.

A description of certain legal proceedings to which we are a party appears in Note 25 “Legal and regulatory matters” beginning on page 219 of our 2022 Annual Consolidated Financial Statements, which note is incorporated by reference herein.

Since October 31, 2021, (a) there have been no penalties or sanctions imposed against us by a court relating to Canadian securities legislation[10] or by a Canadian securities regulatory authority [10] which are individually or in the aggregate material to the Bank, (b) there have been no other penalties or sanctions imposed by a court or regulatory body against us that would likely be considered important to a reasonable investor in making an investment decision, and (c) we have not entered into any settlement agreements with a court relating to Canadian securities legislation[10] or with a Canadian securities regulatory authority [10].

INTEREST OF MANAGEMENT AND OTHERS IN MATERIAL TRANSACTIONS

To the best of our knowledge, there were no directors or executive officers or any associate or affiliate of a director or executive officer with a material interest in any transaction within the three most recently completed financial years or during the current financial year that has materially affected us or is reasonably expected to materially affect us.

[10] National Instrument 14-101 restricts the meaning of “securities legislation” to Canadian provincial and territorial legislation and “securities regulatory authority” to Canadian provincial and territorial securities regulatory authorities.

TRANSFER AGENT AND REGISTRAR

For Canada, Computershare Trust Company of Canada is the transfer agent and registrar for our common shares and our preferred shares. Their principal offices are in the cities of: Montreal, QC; Toronto, ON; Calgary, AB and Vancouver, BC. In the U.S., Computershare Trust Company, N.A. is the co-transfer agent located in Canton, Massachusetts, Jersey City, New Jersey and Louisville, Kentucky. In the U.K., Computershare Services PLC is the co-transfer agent located in Bristol, England.

EXPERTS

PricewaterhouseCoopers LLP (PwC), Chartered Professional Accountants, Licensed Public Accountants, audited our Annual Consolidated Financial Statements, which comprise the consolidated balance sheets as of October 31, 2022 and October 31, 2021 and the related consolidated statements of income, comprehensive income, changes in equity, and cash flows for the years then ended, including the related notes and the effectiveness of our internal control over financial reporting as of October 31, 2022. PwC has advised that they are independent with respect to the Bank within the meaning of the Rules of Professional Conduct of the Chartered Professional Accountants of Ontario and the rules and regulations adopted by the SEC and the Public Company Accounting Oversight Board (United States).

AUDIT COMMITTEE

Audit Committee Mandate

The mandate of the Audit Committee is attached as Appendix C to this Annual Information Form.

Composition of Audit Committee

The Audit Committee consists of Frank Vettese (Chair), Toos N. Daruvala, Cynthia Devine, Maryann Turcke, Bridget A. van Kralingen and Jeffery Yabuki. The board has determined that each member of the Audit Committee is independent under our Director Independence Policy, which incorporates the independence standards under applicable Canadian and U.S. laws and regulations and none receives, directly or indirectly, any compensation from us other than ordinary course compensation for service as a member of the board of directors and its committees or of a board of directors of one or more of our subsidiaries. All members of the Audit Committee are financially literate within the meaning of *National Instrument 52-110 – Audit Committees* and of the Corporate Governance Standards of the NYSE. In considering the criteria for determining financial literacy, the board of directors looks at the ability of a director to read and understand a balance sheet, an income statement and a cash flow statement of a financial institution. The board has determined that each of Frank Vettese, Cynthia Devine and Jeffery Yabuki qualifies as an “audit committee financial expert” as defined by the SEC.

Relevant Education and Experience of Audit Committee Members

In addition to each member’s general business experience, the education and experience of each Audit Committee member that is relevant to the performance of his or her responsibilities as an Audit Committee member is as follows:

Frank Vettese, B.B.A., FCA, earned his Bachelor of Business Administration from the Schulich School of Business and is a Chartered Accountant and a fellow of the Canadian Institute of Chartered Accountants. Mr. Vettese was Managing Partner and Chief Executive of Deloitte Canada from 2012 to June 2019. Mr. Vettese has been a member of the Audit Committee since July 2019.

Toos N. Daruvala earned his MBA from the University of Michigan and his Bachelor of Technology degree in electrical engineering from the Indian Institute of Technology. Mr. Daruvala was Co-Chief Executive Officer of MIO Partners, Inc. from 2015 to 2021, and held various senior positions at McKinsey & Company from 1983 to 2015, including Senior Partner, Risk Practice and Director, Banking and Securities Practice. He concluded his 33 year career at McKinsey & Company by serving as Senior Advisor and Director Emeritus in 2016. Mr. Daruvala has been a member of the Audit Committee since April 2022.

Cynthia Devine, FCPA, FCA, HBA, earned her Honors Business Administration degree from Western University. Ms. Devine became a Fellow of the Institute of Chartered Accountants of Ontario in 2011. Ms. Devine is the interim President and Chief Executive Officer of Maple Leaf Sports & Entertainment. She was the Chief Financial Officer from 2017 to 2022. From 2003 to 2014, Ms. Devine served as Chief Financial Officer of Tim Hortons Inc., and from 2015 to 2017 served as Executive Vice President, Chief Financial Officer and Corporate Secretary of RioCan Real Estate Investment Trust. Ms. Devine serves as a director and Audit Committee Chair for Empire Company Limited/Sobeys Inc. Ms. Devine has been a member of our Audit Committee since July 2020.

Maryann Turcke, B.S., M.S., M.B.A, earned her Bachelor of Science in Civil Engineering degree from Queen's University, her Master of Science in Engineering degree from the University of Toronto and her Master of Business Administration from Queen's University. Ms. Turcke was Chief Operating Officer of the National Football League from 2018 to 2020, President, NFL Network, Digital Media, IT and Films from 2017 to 2018 and President of Bell Media from 2014 to 2017. Ms. Turcke is Senior Advisor of Brookfield Infrastructure Partners. Ms. Turcke has been a member of our Audit Committee since January 2020.

Bridget A. van Kralingen, M.C., B.C., earned her Bachelor of Commerce from the University of the Witwatersrand, South Africa, her Master of Commerce in Industrial and Organisational Psychology from the University of South Africa, and her honours degree in commerce from the University of Johannesburg. Ms. van Kralingen is Senior Vice-President, Special Projects of IBM Corporation. Ms. van Kralingen held various senior positions at IBM Corporation from 2004 to 2021, including Senior Vice-President, Global Markets and Senior Vice-President, Global Business Services. Ms. van Kralingen was Managing Partner at Deloitte Consulting, US from 2001 to 2004. Ms. van Kralingen is a member of the boards of the New York Historical Society and the Partnership for New York City. Ms. van Kralingen has been a member of our Audit Committee since August 2021.

Jeffery Yabuki, B.S., earned his Bachelor of Science in Business Administration and Accounting from California State University, Los Angeles, and was previously licensed as a Certified Public Accountant. Mr. Yabuki is the Chairman of Sportradar AG. Mr. Yabuki was President and Chief Executive Officer of Fiserv, Inc. from 2005 to 2019, Chairman and Chief Executive Officer until 2020, and Executive Chairman until 2020. Mr. Yabuki held various senior positions at H&R Block, Inc. from 1999 to 2005, including the position of Executive Vice President and Chief Operating Officer. Mr. Yabuki has been a member of our Audit Committee since October 2017.

Pre-Approval Policies and Procedures

The Audit Committee has adopted a policy that requires pre-approval by the Audit Committee of audit services and other services within permissible categories of non-audit services. The policy prohibits us from engaging the Bank's independent auditor for "prohibited" categories of non-audit services. A copy of our Pre-Approval Policies and Procedures can be found in Appendix D.

Independent Registered Public Accounting Firm Fees

Following a tender process, PwC was appointed our independent auditor by the Board of Directors on January 29, 2016, which appointment was approved by the Bank's shareholders at the Annual and Special Meeting of Common Shareholders held on April 6, 2016. Fees relating to the years ended October 31, 2022 and October 31, 2021 to PwC and its affiliates, including the nature of each category of fees, are detailed below.

	Year ended October 31, 2022 ($Millions)			Year ended October 31, 2021 ($Millions)		
	Bank and Subsidiaries	**Mutual Funds[(1)]**	**Total**	**Bank and Subsidiaries**	**Mutual Funds[(1)]**	**Total**
Audit fees	41.6	3.3	**44.9**	38.5	2.5	**41.0**
Audit-related fees	9.9	-	**9.9**	8.1	-	**8.1**
Tax fees	0.1	0.3	**0.4**	-	0.3	**0.3**
All other fees	0.5	0.5	**1.0**	0.6	0.6	**1.2**
Total fees	52.1	4.1	**56.2**	47.2	3.4	**50.6**

(1) The Mutual Funds category includes fees paid for professional services provided by PwC for certain mutual funds managed by subsidiaries of the Bank. In addition to other administrative costs, the subsidiaries are responsible for the auditors' fees for professional services rendered in connection with the annual audit, statutory and regulatory filings and other services for the Mutual Funds in return for a fixed administration fee.

Audit Fees

Audit fees were paid for professional services rendered by the Bank's independent auditor for the integrated audit of the Annual Consolidated Financial Statements of the Bank, including its audit of the effectiveness of our internal control over financial reporting, and any financial statement audits of our subsidiaries. In addition, audit fees were paid for services that generally only the Bank's independent auditor reasonably can provide, which includes services provided in connection with statutory and regulatory filings, including those related to prospectuses and other offering documents.

Audit-Related Fees

Audit-related fees were paid for assurance and related services that are reasonably related to the performance of the audit or review of our Annual Consolidated Financial Statements and are not reported under the audit fees item above. These services consisted of:

- special attest services traditionally performed by the Bank's independent auditor not required by statute or regulation;
- reporting on the effectiveness of internal controls as required by contract or for business reasons;
- the audits of the financial statements of our various pension plans;
- the audits of various trusts and limited partnerships; and
- financial and reporting standards advice.

Tax Fees

Tax fees were paid for tax compliance services including preparation of tax returns for certain mutual funds managed by subsidiaries of the bank and a subscription for services to provide specific tax data and information to complete routine tax schedules and calculations for clients.

All Other Fees

These services consist of French translation of financial statements and related continuous disclosure and other public documents containing financial information for us and certain of our subsidiaries, regulatory compliance services as well as accounting and other research publications.

ADDITIONAL INFORMATION

Additional information, including directors' and officers' remuneration and indebtedness, principal holders of our securities, and securities authorized for issuance under equity compensation plans, where applicable, is contained in the Bank's Management Proxy Circular for the most recent annual meeting of shareholders. Additional financial information is provided in our Annual Consolidated Financial Statements and Management's Discussion and Analysis which are included in our 2022 Annual Report.

Copies of this Annual Information Form, our 2022 Annual Report and Management Proxy Circular in respect of the most recent annual meeting of shareholders may be obtained from Investor Relations at 200 Bay Street, South Tower, Toronto, Ontario, M5J 2J5 (416-955-7802).

This Annual Information Form, the Annual Consolidated Financial Statements and Management's Discussion and Analysis for the year ended October 31, 2022, as well as additional information about us may be found on our website at rbc.com, on SEDAR, the Canadian Securities Administrators' website, at sedar.com, and on the EDGAR section of the SEC's website at sec.gov.

Information contained in or otherwise accessible through the websites mentioned in this Annual Information Form does not form a part of this Annual Information Form. All references in this Annual Information Form to websites are inactive textual references and are for your information only.

TRADEMARKS

Trademarks used in this Annual Information Form include the RBC LION & GLOBE Design, ROYAL BANK OF CANADA, RBC, RBC Insurance and Leo LRCN Limited Recourse Trust which are trademarks of Royal Bank of Canada used by Royal Bank of Canada and/or by its subsidiaries under license. All other trademarks mentioned in this Annual Information Form, which are not the property of Royal Bank of Canada, are owned by their respective holders.

APPENDIX A – PRINCIPAL SUBSIDIARIES

(Millions of Canadian dollars) **As at October 31, 2022**

Principal subsidiaries (1)	Principal office address (2)	Carrying value of voting shares owned by the Bank (3)
Royal Bank Holding Inc.	Toronto, Ontario, Canada	$ 77,914
RBC Direct Investing Inc.	Toronto, Ontario, Canada	
RBC Insurance Holdings Inc.	Mississauga, Ontario, Canada	
RBC Life Insurance Company	Mississauga, Ontario, Canada	
R.B.C. Holdings (Bahamas) Limited	Nassau, New Providence, Bahamas	
RBC Caribbean Investments Limited	George Town, Grand Cayman, Cayman Islands	
Royal Bank of Canada Insurance Company Ltd.	Camana Bay, Grand Cayman, Cayman Islands	
Investment Holdings (Cayman) Limited	George Town, Grand Cayman, Cayman Islands	
RBC (Barbados) Funding Ltd.	St. Michael, Barbados	
Capital Funding Alberta Limited	Calgary, Alberta, Canada	
RBC Global Asset Management Inc.	Toronto, Ontario, Canada	
RBC Investor Services Trust	Toronto, Ontario, Canada	
RBC Investor Services Bank S.A.	Esch-sur-Alzette, Luxembourg	
RBC (Barbados) Trading Bank Corporation	St. James, Barbados	
RBC U.S. Group Holdings LLC (2)	Toronto, Ontario, Canada	27,655
RBC USA Holdco Corporation (2)	New York, New York, U.S.	
RBC Capital Markets, LLC (2)	New York, New York, U.S.	
City National Bank	Los Angeles, California, U.S.	
RBC Dominion Securities Limited	Toronto, Ontario, Canada	13,535
RBC Dominion Securities Inc.	Toronto, Ontario, Canada	
Royal Bank Mortgage Corporation	Toronto, Ontario, Canada	5,604
RBC Europe Limited	London, England	2,669
The Royal Trust Company	Montreal, Quebec, Canada	1,215
Royal Trust Corporation of Canada	Toronto, Ontario, Canada	486

(1) The Bank directly or indirectly controls each subsidiary.
(2) Each subsidiary is incorporated or organized under the laws of the state or country in which the principal office is situated, except for RBC U.S. Group Holdings LLC and RBC USA Holdco Corporation which are incorporated under the laws of the State of Delaware, U.S. and RBC Capital Markets, LLC, which is organized under the laws of the State of Minnesota, U.S.
(3) The carrying value of voting shares is stated as the Bank's equity in such investments.

APPENDIX B – EXPLANATION OF RATINGS AND OUTLOOK

Institution	Rating	Outlook
Moody's	● Obligations rated 'Aa' are judged to be of high quality and are subject to very low credit risk. ● Obligations rated 'A' are judged to be upper medium-grade and are subject to low credit risk. ● Obligations rated 'Baa' are judged to be medium-grade and subject to moderate credit risk and as such may possess certain speculative characteristics. ● Moody's appends numerical modifiers 1, 2, and 3 to each generic rating classification from Aa through Caa. The modifier 1 indicates that the obligation ranks in the higher end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of that generic rating category. ● Additionally, a "(hyb)" indicator is appended to all ratings of hybrid securities issued by banks, insurers, finance companies, and securities firms. ● Ratings of 'Prime-1' reflect a superior ability to repay short-term obligations.	A Moody's rating outlook is an opinion regarding the likely rating direction over the medium term.
Standard & Poor's	● An obligation rated 'AA' differs from the highest-rated obligations only to a small degree. The obligor's capacity to meet its financial commitment on the obligation is very strong. ● An obligation rated 'A' is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However, the obligor's capacity to meet its financial commitments on the obligation is still strong. ● An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to weaken the obligor's capacity to meet its financial commitments on the obligation. ● Ratings from 'AA' to 'CCC' may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the rating categories. ● A short-term obligation rated 'A-1' is rated in the highest category by S&P Global Ratings. The obligor's capacity to meet its financial commitments on the obligation is strong. Within this category, certain obligations are designated with a plus sign (+). This indicates that the obligor's capacity to meet its financial commitments on these obligations is extremely strong. A short term obligation rated 'A-1+' has extremely strong capacity to meet its financial commitments.	An S&P Global Ratings outlook assesses the potential direction of a long-term credit rating over the intermediate term, which is generally up to two years for investment grade and generally up to one year for speculative grade.

Institution	Rating	Outlook
Fitch	● 'AA' (Very High Credit Quality) ratings denote expectations of very low default risk. They indicate very strong capacity for payment of financial commitments. This capacity is not significantly vulnerable to foreseeable events. ● 'A' (High Credit Quality) ratings denote expectations of low default risk. The capacity for payment of financial commitments is considered strong. This capacity may, nevertheless, be more vulnerable to adverse business or economic conditions than is the case for higher ratings. ● 'BBB' (Good Credit Quality) ratings indicate that expectations of default risk are currently low. The capacity for payment of financial commitments is considered adequate, but adverse business or economic conditions are more likely to impair this capacity. ● The modifiers "+" or "-" may be appended to a rating to denote relative status within major rating categories. ● 'F1' (Highest Short-Term Credit Quality) ratings indicate the strongest intrinsic capacity for timely payment of financial commitments; may have an added "+" to denote any exceptionally strong credit feature.	Outlooks indicate the direction a rating is likely to move over a one- to two-year period. They reflect financial or other trends that have not yet reached or been sustained the level that would cause a rating action, but which may do so if such trends continue.
DBRS	● An obligation rated 'AA' is of superior credit quality. The capacity for the payment of financial obligations is considered high. Credit quality differs from AAA only to a small degree. Unlikely to be significantly vulnerable to future events. ● An obligation rated 'A' is of good credit quality. The capacity for the payment of financial obligations is substantial, but of lesser credit quality than AA. May be vulnerable to future events, but qualifying negative factors are considered manageable. ● All long term obligation rating categories other than AAA and D also contain subcategories (high) and (low). The absence of either a (high) or (low) designation indicates the credit rating is in the middle of the category. ● R-1 (high) ratings indicate the highest credit quality. The capacity for the payment of short-term financial obligations as they fall due is exceptionally high. Unlikely to be adversely affected by future events. ● Preferred shares rated Pfd-1 are generally of superior credit quality and are supported by entities with strong earnings and balance sheet characteristics. Pfd-1 ratings generally correspond with issuers with a AAA or AA category reference point. ● Preferred shares rated Pfd-2 are generally of good credit quality. Protection of dividends and principal is still substantial, but earnings, the balance sheet and coverage ratios are not as strong as Pfd-1 rated companies. Generally, Pfd-2 ratings correspond with issuers with an A category or higher reference point.	Rating Trends provide guidance in respect of DBRS Morningstar's opinion regarding the outlook for a rating. The Rating Trend indicates the direction in which DBRS Morningstar considers the rating may move if present circumstances continue, or in certain cases as it relates to the Corporate Finance sector, unless challenges are addressed by the issuer.

WHAT THE RATINGS ADDRESS:

Short-term and Long-term Senior Debt

Short-term and long-term senior debt credit ratings are the current opinion of the rating agency on creditworthiness of an obligor with respect to fixed-income obligations whose original maturity is of a short and medium to long-term nature, respectively. They address the possibility that a financial obligation will not be honoured as promised and reflect both the likelihood of default and any financial loss suffered in the event of default.

Subordinated Debt

Subordinated debt credit ratings are the current opinion of the rating agency on creditworthiness of an obligor with respect to a specific financial obligation and a specific class of financial obligation for a specific financial program. Ratings take into consideration the creditworthiness of guarantors, insurers, or other forms of credit enhancement on the obligation and takes into account the currency in which the obligation is denominated.

Preferred Stock

Preferred stock ratings address the issuer's capacity and willingness to pay dividends and principal, in case of limited life, on a timely basis. They address the likelihood of timely payment of dividends, notwithstanding the legal ability to pass on or defer a dividend payment.

Rating Outlook

Rating Outlook assesses the potential direction of a credit rating over the intermediate to longer term. In determining a Rating Outlook consideration is given to any changes in the economic and fundamental business conditions. An Outlook is not necessarily a precursor of a rating change.

APPENDIX C – AUDIT COMMITTEE MANDATE

ROYAL BANK OF CANADA
(the Bank)
May 25, 2022

AUDIT COMMITTEE MANDATE

A. PURPOSE AND DUTIES OF THE COMMITTEE

1. General Purpose

The Committee is responsible for assisting the Bank's board of directors (the Board) in its oversight of (i) the integrity of the Bank's financial statements; (ii) the qualifications, performance and independence of the external auditors; (iii) the performance of the Bank's internal audit function; (iv) internal controls; and (v) compliance with legal and regulatory requirements.

2. Financial Statements and other Documents

The Committee will regularly review and discuss the following:

a) prior to review and approval by the Board, the Bank's annual statement which includes its annual consolidated financial statements, its quarterly financial statements, and related management's discussion and analysis;

b) earnings releases on interim and annual results, the annual information form, the annual report and other financial information, earnings guidance and presentations provided to analysts, rating agencies and the public;

c) such other periodic disclosure documents as requested by regulators or that may be required by law;

d) investments and transactions brought to the Committee's attention that could adversely affect the Bank's well-being;

e) prospectuses relating to the issuance of securities of the Bank;

f) representations provided by management to the auditors, where appropriate;

g) reports on any litigation matters which could significantly affect the Bank;

h) tax matters that are material to the financial statements;

i) reports from the Chief Compliance Officer (the CCO) on regulatory compliance matters, and from the Chief Anti-Money Laundering Officer (the CAMLO) on anti-money laundering matters; and

j) other reports as required to be communicated by the auditors by the Canadian Public Accountability Board, the Office of the Superintendent of Financial Institutions, and the U.S. Public Company Accounting Oversight Board.

Moreover, the Committee will ensure that adequate procedures are in place for the review of the Bank's public disclosure of financial information derived from the Bank's financial statements, and will periodically assess the adequacy of these procedures.

3. External Auditor

Subject to the shareholders' powers conferred by the *Bank Act*, the Committee will recommend the appointment (or revocation thereof) of any registered public accounting firm (including the external auditor) engaged to prepare or issue an audit report or to perform other audit, review or attest services. The Committee will fix the remuneration and oversee the work of these accounting firms, including the resolution of disagreements with management regarding financial reporting. Such accounting firms will report directly to the Committee.

Moreover, as part of its oversight of the external auditor the Committee will:

a) meet with the external auditor to review and discuss the annual audit plan, the results of the audit, the auditor's report with respect to the annual statement, and all other reports, returns and transactions as required by applicable laws;

b) approve all audit engagement fees and terms, as well as the terms of any permitted non-audit services to be provided by the external auditor to the Bank, with such approvals to be given specifically or pursuant to preapproval policies and procedures adopted by the Committee in accordance with applicable laws;

c) review any concerns that may be brought forward by the external auditor, including any difficulties they may encounter in conducting their audit, as well as management's response to such concerns;

d) review material correspondence between the external auditor and management relating to audit findings;

e) taking into account the opinions of management and the Bank's internal auditor, annually assess the external auditor's qualifications and performance, including relevant experience, geographical reach, professional scepticism, quality of services and communications, and independence and objectivity;

f) review formal written statements delineating all relationships between the external auditor and the Bank that may impact its independence and objectivity;

g) annually assess the risk of the external auditor withdrawing from the audit;

h) discuss with the external auditor and with management the annual audited financial statements and quarterly financial statements, as well as related management's discussion and analysis;

i) review hiring policies concerning partners, employees and former partners and employees of the present and former external auditors;

j) review and evaluate the qualifications, performance and independence of the external auditor's lead partner and discuss the timing and process for implementing the rotation of the lead audit partner, the concurring audit partners and any other active audit engagement team partner;

k) on a periodic basis, perform a comprehensive review of the performance of the External Auditor over multiple years to assess the audit firm, its independence and application of

professional skepticism; and

l) at least annually, obtain and review a report by the external auditor describing: (i) the external auditor's internal quality-control procedures; (ii) the external auditor's internal procedures to ensure independence; and (iii) any material issues raised by the most recent internal quality-control review or peer review of the external auditors, or by any inquiry or investigation by governmental or professional authorities, within the preceding five years, respecting one or more independent audits carried out by the external auditor, and any steps taken to deal with any such issues.

4. Oversight of Independent Control Functions

The Committee will oversee the finance, compliance, anti-money laundering and internal audit functions, having regard to their independence from the businesses whose activities they review. The Committee will review and approve the appointment or removal of each of the Chief Financial Officer (the CFO), the CCO, the CAMLO, and the Chief Audit Executive (the CAE), as well as their respective mandates and the mandates or charters of their respective functions. The Committee will approve each of the functions' organizational structures, budgets and resources. Every year the Committee will assess the performance of each of the CFO, CCO, CAMLO and CAE and the effectiveness their respective functions. It will also periodically review independent assessments of each of these functions. Moreover, it will annually review and approve the internal audit function's overall risk methodology.

5. Internal Control

The Committee will assist in the oversight of internal control by engaging in the following activities:

a) requiring management to implement and maintain appropriate systems of internal control, including internal controls over financial reporting and for the prevention and detection of fraud and error;

b) evaluating and approving systems of internal control and meeting regularly with the CAE and with management to assess the adequacy and effectiveness of these systems;

c) receiving reasonable assurances on a regular basis from management that the organization is in control;

d) reviewing reports from the Chief Executive Officer (the CEO) and the CFO regarding any significant deficiency or material weakness in the design or operation of internal controls over financial reporting and the detection of fraud involving management or other employees who have a significant role in the Bank's internal control over financial reporting;

e) reviewing and approving the Bank's disclosure policy and reviewing reports on the effectiveness of the Bank's disclosure controls and procedures;

f) reviewing the process relating to the CEO and CFO's certifications on the design and effectiveness of the Bank's disclosure controls and procedures and internal control over financial reporting, and the integrity of the Bank's quarterly and annual financial statements.

6. Internal Auditor

The Committee will regularly meet with the CAE to review and approve the annual internal audit plan and review internal audit activities. The Committee will review and discuss with the CAE issues reported to management by the internal audit function and management's responses and/or corrective actions. The Committee will also evaluate the status of identified control weaknesses, as well as the adequacy and degree of compliance with the Bank's systems of internal control. Other issues that the Committee may review with the CAE include audit scope, information access, resource limitations or any other difficulties encountered by the internal audit function.

7. Capital Management

The Committee will review capital transactions and may designate and authorize the issue of (i) First Preferred Shares and (ii) securities qualifying as additional Tier 1 capital under capital adequacy guidelines issued by the Superintendent of Financial Institutions. The Committee may also review and approve securities disclosure documents in connection with issues of the Bank's subordinated indebtedness as provided in the relevant resolution of the Board.

The Committee will review the adequacy and effectiveness of internal controls related to capital management. It will also discuss with the external auditors any matters arising from the audit that may have an impact on regulatory or capital disclosures included in the Bank's annual statement.

8. Committee Reports

The Committee is responsible for preparing any report from the Committee that may be included in the Bank's annual proxy statement.

9. Other

a) The Committee will discuss major issues regarding accounting principles and financial statement presentations, including significant changes in the Bank's selection or application of accounting principles and analyses prepared by management or the external auditors regarding financial reporting issues and judgments made in connection with the preparation of the financial statements;

b) The Committee will establish procedures for managing complaints received by the Bank regarding accounting, internal accounting controls or auditing matters, as well as procedures for the confidential and anonymous submission by employees of concerns regarding accounting, internal accounting controls or auditing matters. The Committee will receive reports from the Ombudsman at each Committee meeting and will meet with the Ombudsman annually in relation to these procedures;

c) The Committee will review and discuss any reports concerning material violations submitted to it by the Bank's legal counsel pursuant to applicable law and policy;

d) The Committee will discuss the major financial risk exposures of the Bank and the steps management has taken to monitor and control such exposures;

e) Subject to the laws applicable to the subsidiary, the Committee may perform for and on behalf of a subsidiary the functions of an audit committee of the subsidiary.

B. COMMITTEE COMPOSITION AND PROCEDURES

1. Composition of Committee

The Committee will be composed of five or more directors. No Committee member may be an officer or employee of the Bank or of an affiliate of the Bank. Each Committee member will be (i) unaffiliated, as determined in accordance with the regulations made under the *Bank Act*, and (ii) independent, as determined by director independence standards adopted by the Board. Committee membership will reflect a balance of experience and expertise required to fulfill the Committee's mandate.

All Committee members will be financially literate or become financially literate within a reasonable period after appointment to the Committee. At least one member will have accounting or financial management expertise. No member may serve on the audit committees of more than two other public companies, unless the Board determines such simultaneous service would not impair the member's ability to serve effectively on the Committee.

2. Appointment of Committee Members

The Board will appoint or reappoint the Committee members at the annual organizational meeting of the directors. In the normal course members will serve a minimum of three years. Each member will remain a member until a successor is appointed, unless the member resigns, is removed or ceases to be a director. The Board may fill a vacancy that occurs in the Committee at any time.

3. Committee Chair and Secretary

The Board will appoint or reappoint a Committee Chair from among the members of the Committee. If the Board fails to do so, the Committee members will make the appointment or re-appointment. In the normal course the Committee Chair will serve a minimum of three years. The Committee Chair will not be a former employee of the Bank or of an affiliate. The Secretary of the Committee need not be a director.

4. Time and Place of Meetings

Meetings may be called by any Committee member, the external auditors, the CFO, the Board Chair, the CEO or the Chief Audit Executive. The Committee members will determine the time and place of and the procedure at meetings, provided that the Committee meets at least quarterly. The Committee members may participate in meetings in person or by telephone, electronic or other communications facilities. The Committee may request any officer or employee of the Bank or the Bank's outside counsel or external auditors to attend a meeting of the Committee or to meet with any members of, or consultants to, the Committee.

5. Quorum

A quorum for meetings will be three members.

6. Notice of Meetings

Notice of the time and place of each meeting will be generally given in writing or by telephone, or by electronic or other communications facilities, to each Committee member and to the external auditors at least 24 hours prior to the time fixed for such meeting; however,

a) a member may in any manner waive notice of a meeting and attendance of a member at a meeting is a waiver of notice of the meeting, except where a member attends a meeting for the express purpose of objecting to the transaction of any business on the grounds that the meeting is not lawfully called;

b) a resolution in writing signed by all the members entitled to vote on that resolution at a Committee meeting, other than a resolution of the Committee carrying out its duties under subsection 194(3) of the *Bank Act*, will be as valid as if it had been passed at a meeting of the Committee; and

c) capital transactions may be reviewed and/or authorized at a meeting of which at least one hour prior notice is given.

7. Delegation

The Committee may designate a sub-committee to review any matter within the Committee's mandate.

8. Reporting to the Board

The Committee will report to the Board following each meeting with respect to its activities and recommendations. It will also report to the Board on the annual statement and returns that must be approved by the directors under the *Bank Act*.

9. Access to Management and External Advisors

In fulfilling its responsibilities, the Committee will have unrestricted access to management and employees of the Bank. The Committee will select, retain, oversee, terminate and approve the fees of any external advisor that the Committee deems necessary, including any legal or accounting advisor, to assist it in fulfilling its responsibilities. The Bank will provide appropriate funding, as determined by the Committee, for any such engagement.

The Committee may also investigate any matter with full access to all books, records, facilities, management and employees of the Bank.

10. Private Meetings

At least quarterly the Committee will meet with no members of management present and have separate private meetings with the external auditors, and each of the CAE, the CFO, the CCO, the CAMLO and the Chief Legal Officer, to discuss any matters that the Committee or these parties believe should be discussed.

11. Minutes

Minutes of meetings of the Committee will be maintained by the Secretary and subsequently presented to the Committee and to the Board, if required by the Board.

12. Evaluation of Effectiveness and Review of Mandate

The Committee will annually review and assess the adequacy of its mandate and evaluate its effectiveness in fulfilling its mandate.

APPENDIX D – PRE-APPROVAL POLICIES AND PROCEDURES

Policies and Procedures
for the Monitoring, and Pre-Approval of Services
to be Performed by Public Accounting Firms
and the Review of the External Auditors
(effective January 28, 2020)

Mandate

1. The mandate of the Audit Committee established by the Board of Directors ("Board") confers on the Audit Committee the authority and responsibility (among other things) to:

   - Pre-approve all audit and any legally permissible non-audit services to be provided by the external auditors and all audit, review and attest services provided by any other public accounting firm, with such approval to be given either specifically or pursuant to pre-approval policies and procedures adopted by the Audit Committee; and
   - To complete an annual and five year comprehensive reviews of the external auditor's performance and to recommend to the Board the selection and termination of the external auditor subject to shareholder approval.

Purpose

2. These Policies and Procedures are intended to:

   a) specify the methods by which the Audit Committee may pre-approve the provision of audit, review and attest services by any public accounting firm to the Bank and its subsidiaries;

   b) specify the methods by which the Audit Committee may pre-approve the provision of non-audit services to the Bank and its subsidiaries by the Bank's external auditors and their affiliates (the "auditors") that do not impair the independence of the auditors under applicable laws and professional standards, including the rules of the Chartered Professional Accountants Canada, the Public Company Accounting Oversight Board ("PCAOB"), the Canadian Securities Administrators and the U.S. Securities and Exchange Commission;

   c) set forth procedures designed to ensure that any services to be provided by the auditors and that any audit, review or attestation services to be performed by any other public accounting firm have been properly authorized and pre-approved under the authority of the Audit Committee, and that the Audit Committee is promptly informed of each service;

   d) ensure that the Audit Committee's responsibilities are not delegated to management in violation of applicable law;

   e) specify the policies relating to the annual and comprehensive evaluation of the external auditor and selection of the external auditor by the Audit Committee for recommendation to the Board.

Required Approval of Audit and Non-Audit Services

3. The Audit Committee shall pre-approve all engagements of the auditors by:

   a) the Bank; or
   b) any subsidiary.

4. The Audit Committee shall pre-approve all engagements of any public accounting firm to provide audit, review or attest services to:

   a) the Bank; or
   b) any subsidiary.

5. The Audit Committee shall evidence its pre-approval by resolution of the Audit Committee or through the exercise of delegated authority in accordance with these Policies and Procedures.

6. "Subsidiary" has the meaning set forth in Rule 1-02(x) of the U.S. Securities and Exchange Commission's Regulation S-X.

7. For the purpose of these Policies and Procedures and any pre-approval:

   a) "Audit services" include services that are a necessary part of the audit process and any activity that is a necessary procedure used by the accountant in reaching opinions on the financial statements and on internal control over financial reporting as is required under applicable auditing standards ("AAS"), including technical reviews to reach an audit judgment on complex accounting issues;

   b) The term "audit services" is broader than those services strictly required to perform an audit pursuant to AAS and include such services as:
      i) the issuance of comfort letters and consents in connection with offerings of securities;
      ii) the performance of domestic and foreign statutory audits;
      iii) attest services required by statute or regulation; and
      iv) assistance with and review of documents filed with the Office of the Superintendent of Financial Institutions, Canadian Securities Administrators, the Securities and Exchange Commission, the Board of Governors of the Federal Reserve Board and other regulators having jurisdiction over the activities of the Bank and its subsidiaries, and responding to comments from such regulators;

   c) "Audit-related" services are assurance and related services traditionally performed by the principal accountant and that are reasonably related to the performance of the audit or review of financial statements and not categorized under "audit fees" for disclosure purposes.

      "Audit-related services" include:
      i) employee benefit plan audits, including audits of employee pension plans,
      ii) due diligence related to mergers and acquisitions,
      iii) consultations and audits in connection with acquisitions, including evaluating the accounting treatment for proposed transactions;
      iv) internal control reviews;
      v) attest services not required by statute or regulation; and
      vi) consultations regarding financial accounting and reporting standards.

      Non-financial operational audits are not "audit-related" services;

   d) "Review services" are services applied to unaudited financial statements and consist of the inquiry and analytical procedures that provide the accountant with a reasonable basis for expressing limited assurance that there are no material modifications that should be made to financial statements for them to be in conformity with International Financial Reporting Standards or, if applicable, any other comprehensive basis of accounting;

   e) "Attest" services are those engagements where the accountant issues an examination, a review, or an agreed-upon procedures report on a subject matter, or an assertion about the subject matter that is the responsibility of another party. Examples of the subject matter of an "attest" engagement include: examinations (i.e., audits) of financial forecasts and projections;

reviews of pro-forma financial information; reporting on a company's internal control over financial reporting; and examinations of compliance with contractual arrangements or laws and regulations.

f) A "subsidiary" of a specified person is an affiliate controlled by such person directly, or indirectly through one or more intermediaries.

External Auditor Selection and Appointment

8. The Audit Committee shall monitor, review and assess the quality of the external auditor on an annual basis. The annual assessment will include:

a) quality and thoroughness of the audit approach and methodology;
b) level of professional skepticism, and critical judgments applied by the audit team;
c) independence of the external audit firm and the engagement partner;
d) skills and knowledge of the audit team;
e) level of understanding of our businesses and the financial services industry;
f) sufficiency of resources and ability to complete the audit in a timely manner;
g) partner rotation;
h) value for money;
i) quality of communications;
j) risk of likelihood of withdrawal from the audit;
k) input from senior management of RBC;
l) input from RBC Internal Audit Services;
m) a self assessment prepared by the auditor; and
n) audit quality metrics and other matters as determined by the Audit Committee or the Board of Directors.

9. At least every five years the Audit Committee will conduct a comprehensive assessment of the external auditor. The assessment will include:

a) considerations included within the annual assessment;
b) performance since the last comprehensive review, or appointment of the external auditor;
c) quality and continuity of the engagement team;
d) tenure of the auditor;
e) incidence of independence threats and effectiveness of applied safeguards;
f) track record of the auditor applying professional skepticism; and
g) responsiveness to changes in the Bank's businesses (i.e. significant acquisitions or changes to systems) and calls for improvement from regulators, inspectors, Audit Committees or management.

10. The Audit Committee will take the following into account in deciding whether to recommend the tendering of the external audit engagement of the Bank:

a) the results of the annual and comprehensive assessments (refer to factors described in sections 8 and 9);
b) the impact of regulatory and legislative requirements, including mandatory tendering and rotation requirements on the Bank and its subsidiaries; and
c) other factors deemed relevant by the Audit Committee or the Board.

Delegation

11. The Audit Committee may from time to time delegate to one or more of its members who are "independent" (within the meanings of applicable law and the rules or policies of a securities commission having jurisdiction, and the New York Stock Exchange) the power to pre-approve from time to time:

a) audit, review or attest services to be provided by any public accounting firm (including the auditors) that have not been otherwise approved by the Audit Committee;

b) permissible non-audit services to be provided by the auditors that have not otherwise been approved by the Audit Committee, and
c) changes in the scope of pre-approved engagements and the maximum estimated fees for engagements that have been pre-approved by the Audit Committee.

12. The member(s) exercising such delegated authority must report at the next regularly scheduled meeting of the Audit Committee any services that were pre-approved under this delegated authority since the date of the last regularly scheduled meeting.

13. The member(s) exercising delegated authority may evidence his or her approval by signing an instrument in writing that describes the engagement with reasonable specificity, or by signing an engagement letter containing such a description.

14. In addition, member(s) exercising delegated authority may pre-approve an engagement orally, if any such oral approval is promptly confirmed in writing. Such written confirmation may be given by fax or e-mail and must describe the engagement with reasonable specificity.

15. The Audit Committee may delegate to management a limited ($500,000) fee addendum budget on an annual basis relating to fees that may arise subsequent to submission of fees for approval at the next scheduled meeting of the Audit Committee for engagements required to be completed in advance of the next scheduled meeting of the Audit Committee. Any engagement subject to this budget will be limited to those with little or no risk of independence breaches, and will be reported to the Audit Committee at the next scheduled meeting held following the end of each fiscal quarter end. The limitation on the scope of services only extend to: (i) addendums to existing statutory audit engagements, (ii) new audit and audit-related engagements; and (iii) audit-related services related to Service Organization Control 1 reports and include a limitation on fee increases to on-half or less of the original pre-approved fee, capped at a maximum of $100,000 per engagement.

Responsibilities of External Auditors

16. To support the independence process, the external auditors shall:

a) confirm in engagement letters that performance of the work will not impair independence;
b) satisfy the Audit Committee that they have in place comprehensive internal policies and processes to ensure adherence, world-wide, to independence requirements, including robust monitoring and communications;
c) provide communication and confirmation to the Audit Committee on independence on a regular basis, and at least annually;
d) provide for Audit Committee approval, in connection with each annual audit engagement, a detailed scope of services outlining each individual audit to be performed and a detailed description of audit-related services;
e) utilize the tracking numbers assigned by management to all pre-approved services in all fee billings and correspondence, provide detailed annual fee reporting and review management's detailed quarterly fee reporting.
f) communicate to the Audit Committee all matters required to be communicated by the Canadian Public Accountability Board and U.S. Public Company Accounting Oversight Board.
g) maintain certification by the Canadian Public Accountability Board and registration with the U.S. Public Company Accounting Oversight Board; and
h) review their partner rotation plan and advise the Audit Committee on an annual basis.

Engagements

17. The Audit Committee will not, as a general rule, pre-approve a service more than one year prior to the time at which it is anticipated that the firm of accountants will be engaged to provide the service.

18. Engagements will not be considered to be revolving in nature and may not operate from year-to-year without reapproval.

19. All audit and non-audit services to be provided by the auditors, and all audit, review or attest services to be provided by any public accounting firm, shall be provided pursuant to an engagement letter that shall:

    a) be in writing and signed by the auditors or public accounting firm;
    b) specify the particular services to be provided;
    c) specify the period in which the services will be performed;
    d) specify the maximum total fees to be paid; and
    e) in the case of engagements of the auditors, include a confirmation by the auditors that the services are not within a category of services the provision of which would impair their independence under applicable law and Canadian and U.S. generally accepted auditing standards.

20. Management shall, before signing and delivering an engagement letter on behalf of the Bank or a subsidiary and before authorizing the commencement of an engagement:

    a) obtain an engagement letter in accordance with these Policies and Procedures;
    b) confirm that the services are described in the engagement letter accurately and with reasonable specificity;
    c) obtain confirmation from the auditors that they have conducted an analysis that supports their conclusion that performance of the services will not impair their independence;
    d) with respect to engagements for the provision of services other than audit and audit-related services, obtain confirmation from legal counsel of the Bank that performance of the services will not impair independence; and
    e) verify that the performance of the services has specifically been approved by the Audit Committee or a member in accordance with authority delegated by the Audit Committee.

All engagement letters entered into pursuant to these Policies and Procedures shall be made available to the Audit Committee.

Tax Services

21. The Audit Committee, and any member in the exercise of delegated power, shall consider the provision of tax services by the auditors on an engagement-by-engagement basis.

22. The Audit Committee shall not pre-approve, and any member of the Audit Committee may not exercise delegated power to engage the auditors to provide, tax services to the Bank or a subsidiary:

    a) to represent the Bank or a subsidiary before a tax or other court;
    b) if the provision of the services would be prohibited, as prescribed by paragraph 26 of these Policies and Procedures; or
    c) related to marketing, planning or opinion in favour of the tax treatment of (1) a transaction offered under conditions of confidentiality and for which a fee has been or will be paid by the Bank; or (2) a transaction that was initially recommended directly or indirectly, by the accountant and a significant purpose of which is tax avoidance, unless the proposed tax treatment is at least more likely than not to be allowable under applicable tax laws.

23. The Audit Committee shall not pre-approve, and any member of the Audit Committee may not exercise delegated power to engage the auditors to provide, tax services to a person in a financial oversight role at the Bank, or an immediate family member of such a person, except as would be permitted by the PCAOB rules.

Other Non-Audit Services

24. The Audit Committee, and any member in the exercise of delegated power, shall consider the provision of other non-audit services (non-audit services other than audit-related services and tax services, and including non-audit services relating to internal control and business recovery services) by the auditors on an engagement-by-engagement basis. Any approval of non-audit services relating to internal control must be preceded by a discussion with the auditors of the potential effects of the services on independence as required by the rules of the PCAOB.

Value-Added Services

25. The Audit Committee recognizes and approves of the fact that the auditors from time to time provide, without charge or commitment, value added services to the Bank and its subsidiaries that do not involve an engagement of the auditors. Such value added services may include surveys, educational sessions, workshops, roundtable meetings with peers, benchmarking studies, and monitoring of contest draws as an independent observer. The Audit Committee receives and reviews periodic reports from management and the auditors providing representative examples of such services as part of its monitoring of the Bank's overall relationship with the auditors.

Prohibited Services

26. The Audit Committee shall not pre-approve, and any member may not exercise delegated power to engage the auditors to provide, any services, including tax services or business recovery services, that (i) provide for a contingency or commission fee arrangement; or (ii) involve the auditors performing any of the non-audit services set forth in paragraph (c)(4) of Rule 2-01 of the U.S. Securities and Exchange Commission's Regulation S-X, which include:

    a. providing bookkeeping or other services related to the accounting records or financial statements of the Bank or any of its subsidiaries,
    b. providing financial information systems design and implementation to the Bank or any of its subsidiaries,
    c. providing actuarial services to the Bank or any of its subsidiaries,
    d. providing internal audit outsourcing services to the Bank or any of its subsidiaries,
    e. providing human resources services to the Bank or any of its subsidiaries,
    f. providing broker-dealer, investment adviser, or investment banking services to the Bank or any of its subsidiaries,
    g. functioning in the role of management for the Bank or any of its subsidiaries,
    h. auditing their own work in relation to the Bank or any of its subsidiaries,
    i. providing appraisal or valuation services, contribution in kind reports or fairness opinions to the Bank or any of its subsidiaries,
    j. serving in an advocacy role for the Bank or any of its subsidiaries,
    k. providing legal services to the Bank or any of its subsidiaries,
    l. providing services that fall within the category of "expert" services that are prohibited by applicable law to the Bank or any of its subsidiaries, or
    m. providing services to the Bank or any of its subsidiaries that would otherwise compromise their independence under applicable regulatory guidance.

For the purposes of the Prohibited Services listed in this Section 26 above, a "subsidiary" includes any entity for which the Bank uses the equity method of accounting and where it is material to the Bank.

Therefore, the Audit Committee is not permitted to pre-approve the provision of the prohibited services listed above by the auditors to these entities.

Timely Reporting to the Audit Committee

27. Management shall provide a quarterly written report to the Audit Committee of services performed and related fees, at the scheduled meeting of the Audit Committee held following the end of each fiscal quarter end.

No Delegation to Management

28. Nothing in these Policies and Procedures shall be interpreted as a delegation to management of the Audit Committee's responsibilities in violation of applicable law.

Effective Date

29. These updated Policies and Procedures are effective as and from January 28, 2020.

Disclosure

30. The Bank shall disclose these Policies and Procedures in its periodic filings, as required by applicable law.

Review

31. The Audit Committee shall review and reassess the adequacy of these Policies and Procedures on a triennial basis.

Table of Contents

Exhibit 2

Management's Discussion and Analysis

Management's Discussion and Analysis (MD&A) is provided to enable a reader to assess our results of operations and financial condition for the fiscal year ended October 31, 2022, compared to the preceding fiscal year. This MD&A should be read in conjunction with our 2022 Annual Consolidated Financial Statements and related notes and is dated November 29, 2022. All amounts are in Canadian dollars, unless otherwise specified, and are based on financial statements presented in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB), unless otherwise noted.

Additional information about us, including our 2022 Annual Information Form, is available free of charge on our website at rbc.com/investorrelations, on the Canadian Securities Administrators' website at sedar.com and on the EDGAR section of the United States (U.S.) Securities and Exchange Commission's (SEC) website at sec.gov.

Information contained in or otherwise accessible through the websites mentioned herein does not form part of this report. All references in this report to websites are inactive textual references and are for your information only.

Table of contents

Caution regarding forward-looking statements 20
Overview and outlook 21
Selected financial and other highlights 21
About Royal Bank of Canada 22
Vision and strategic goals 22
Economic, market and regulatory review and outlook 22
Key corporate events of 2022 23
Defining and measuring success through total shareholder returns 24
Financial performance 24
Overview 24
Impact of foreign currency translation 25
Total revenue 25
Provision for credit losses 26
Insurance policyholder benefits, claims and acquisition expense 27
Non-interest expense 27
Income and other taxes 27
Client assets 28
Business segment results 29
Results by business segment 29
How we measure and report our business segments 29
Key performance and non-GAAP measures 30
Personal & Commercial Banking 32
Wealth Management 37
Insurance 43
Investor & Treasury Services 47
Capital Markets 49
Corporate Support 53
Quarterly financial information 53
Fourth quarter performance 53
Quarterly results and trend analysis 54
Financial condition 55
Condensed balance sheets 55
Off-balance sheet arrangements 56
Risk management 58
Top and emerging risks 58
Overview 60
Enterprise risk management 61
Transactional/positional risk drivers 66
Credit risk 66
Market risk 76
Liquidity and funding risk 81
Insurance risk 94
Operational/regulatory compliance risk drivers 94
Operational risk 94
Regulatory compliance risk 96
Strategic risk drivers 97
Strategic risk 97
Reputation risk 97
Legal and regulatory environment risk 98
Competitive risk 99
Macroeconomic risk drivers 99
Systemic risk 99
Overview of other risks 100
Capital management 105
Accounting and control matters 114
Critical accounting policies and estimates 114
Controls and procedures 117
Related party transactions 117
Supplementary information 118
Glossary 126
Enhanced Disclosure Task Force recommendations index 128

Caution regarding forward-looking statements

From time to time, we make written or oral forward-looking statements within the meaning of certain securities laws, including the "safe harbour" provisions of the *United States Private Securities Litigation Reform Act of 1995* and any applicable Canadian securities legislation. We may make forward-looking statements in this 2022 Annual Report, in other filings with Canadian regulators or the SEC, in other reports to shareholders, and in other communications. Forward-looking statements in this document include, but are not limited to, statements relating to our financial performance objectives, vision and strategic goals, the economic, market, and regulatory review and outlook for Canadian, U.S., U.K., European and global economies, the regulatory environment in which we operate, the impact from rising interest rates, the expected closing of the transaction involving HSBC Bank Canada, the Strategic priorities and Outlook sections for each of our business segments, the risk environment including our credit risk, market risk, liquidity and funding risk, the direction of the coronavirus (COVID-19) pandemic and its potential impact on our business operations, financial results, condition and objectives and on the global economy and financial market conditions, our climate- and sustainability-related beliefs, targets and goals (including our net-zero and sustainable finance commitments), and includes our President and Chief Executive Officer's statements. The forward-looking information contained in this document is presented for the purpose of assisting the holders of our securities and financial analysts in understanding our financial position and results of operations as at and for the periods ended on the dates presented, as well as our financial performance objectives, vision and strategic goals, and may not be appropriate for other purposes. Forward-looking statements are typically identified by words such as "believe", "expect", "foresee", "forecast", "anticipate", "intend", "estimate", "goal", "commit", "target", "objective", "plan" and "project" and similar expressions of future or conditional verbs such as "will", "may", "might", "should", "could" or "would".

By their very nature, forward-looking statements require us to make assumptions and are subject to inherent risks and uncertainties, which give rise to the possibility that our predictions, forecasts, projections, expectations or conclusions will not prove to be accurate, that our assumptions may not be correct that our financial performance, environmental & social or other objectives, vision and strategic goals will not be achieved, and that our actual results may differ materially from such predictions, forecasts, projections, expectations or conclusions.

We caution readers not to place undue reliance on these statements as a number of risk factors could cause our actual results to differ materially from the expectations expressed in such forward-looking statements. These factors – many of which are beyond our control and the effects of which can be difficult to predict – include: credit, market, liquidity and funding, insurance, operational, regulatory compliance (which could lead to us being subject to various legal and regulatory proceedings, the potential outcome of which could include regulatory restrictions, penalties and fines), strategic, reputation, competitive, model, legal and regulatory environment, systemic risks and other risks discussed in the risk sections of our 2022 Annual Report including business and economic conditions in the geographic regions in which we operate, Canadian housing and household indebtedness, information technology and cyber risks, geopolitical uncertainty, environmental and social risk (including climate change), digital disruption and innovation, privacy, data and third-party related risks, regulatory changes, culture and conduct risks, the effects of changes in government fiscal, monetary and other policies, tax risk and transparency, and the emergence of widespread health emergencies or public health crises such as pandemics and epidemics, including the COVID-19 pandemic and its impact on the global economy, financial market conditions and our business operations, and financial results, condition and objectives. Additional factors that could cause actual results to differ materially from the expectations in such forward-looking statements can be found in the risk section of our 2022 Annual Report.

We caution that the foregoing list of risk factors is not exhaustive and other factors could also adversely affect our results. When relying on our forward-looking statements to make decisions with respect to us, investors and others should carefully consider the foregoing factors and other uncertainties and potential events. Material economic assumptions underlying the forward-looking statements contained in this 2022 Annual Report are set out in the Economic, market and regulatory review and outlook section and for each business segment under the Strategic priorities and Outlook headings. Except as required by law, we do not undertake to update any forward-looking statement, whether written or oral, that may be made from time to time by us or on our behalf.

Additional information about these and other factors can be found in the risk sections of this 2022 Annual Report.

Overview and outlook

Selected financial and other highlights — Table 1

(Millions of Canadian dollars, except per share, number of and percentage amounts)	2022	2021	2022 vs. 2021 Increase (decrease)	
Total revenue	$ 48,985	$ 49,693	$ (708)	(1.4)%
Provision for credit losses (PCL)	484	(753)	1,237	(164.3)%
Insurance policyholder benefits, claims and acquisition expense (PBCAE)	1,783	3,891	(2,108)	(54.2)%
Non-interest expense	26,609	25,924	685	2.6%
Income before income taxes	20,109	20,631	(522)	(2.5)%
Net income	$ 15,807	$ 16,050	$ (243)	(1.5)%
Segments – net income				
Personal & Commercial Banking	$ 8,370	$ 7,847	$ 523	6.7%
Wealth Management	3,144	2,626	518	19.7%
Insurance	857	889	(32)	(3.6)%
Investor & Treasury Services	513	440	73	16.6%
Capital Markets	2,921	4,187	(1,266)	(30.2)%
Corporate Support	2	61	(59)	n.m.
Net income	$ 15,807	$ 16,050	$ (243)	(1.5)%
Selected information				
Earnings per share (EPS) – basic	$ 11.08	$ 11.08	$ 0.00	0.0%
– diluted	11.06	11.06	0.00	0.0%
Return on common equity (ROE) (1)	16.4%	18.6%	n.m.	(220) bps
Average common equity (1)	$ 94,700	$ 84,850	$ 9,850	11.6%
Net interest margin (NIM) – on average earning assets, net (2)	1.48%	1.48%	n.m.	– bps
PCL on loans as a % of average net loans and acceptances	0.06%	(0.10)%	n.m.	16 bps
PCL on performing loans as a % of average net loans and acceptances	(0.04)%	(0.20)%	n.m.	16 bps
PCL on impaired loans as a % of average net loans and acceptances	0.10%	0.10%	n.m.	– bps
Gross impaired loans (GIL) as a % of loans and acceptances	0.26%	0.31%	n.m.	(5) bps
Liquidity coverage ratio (LCR) (3)	125%	123%	n.m.	200 bps
Net stable funding ratio (NSFR) (3)	112%	116%	n.m.	(400) bps
Capital, Leverage and Total loss absorbing capacity (TLAC) ratios (4)				
Common Equity Tier 1 (CET1) ratio	12.6%	13.7%	n.m.	(110) bps
Tier 1 capital ratio	13.8%	14.9%	n.m.	(110) bps
Total capital ratio	15.4%	16.7%	n.m.	(130) bps
Leverage ratio	4.4%	4.9%	n.m.	(50) bps
TLAC ratio (5)	26.4%	n.a.	n.a.	n.a.
TLAC leverage ratio (5)	8.5%	n.a.	n.a.	n.a.
Selected balance sheet and other information (6)				
Total assets	$ 1,917,219	$ 1,706,323	$ 210,896	12.4%
Securities, net of applicable allowance	318,223	284,724	33,499	11.8%
Loans, net of allowance for loan losses	819,965	717,575	102,390	14.3%
Derivative related assets	154,439	95,541	58,898	61.6%
Deposits	1,208,814	1,100,831	107,983	9.8%
Common equity	100,746	91,983	8,763	9.5%
Total risk-weighted assets	609,879	552,541	57,338	10.4%
Assets under management (AUM) (2)	999,700	1,008,700	(9,000)	(0.9)%
Assets under administration (AUA) (2), (7)	5,649,700	6,347,300	(697,600)	(11.0)%
Common share information				
Shares outstanding (000s) – average basic	1,403,654	1,424,343	(20,689)	(1.5)%
– average diluted	1,406,034	1,426,735	(20,701)	(1.5)%
– end of period	1,382,911	1,424,525	(41,614)	(2.9)%
Dividends declared per common share	$ 4.96	$ 4.32	$ 0.64	14.8%
Dividend yield (2)	3.7%	3.8%	n.m.	(10) bps
Dividend payout ratio (2)	45%	39%	n.m.	600 bps
Common share price (RY on TSX) (8)	$ 126.05	$ 128.82	$ (2.77)	(2.2)%
Market capitalization (TSX) (8)	174,316	183,507	(9,191)	(5.0)%
Business information (number of)				
Employees (full-time equivalent) (FTE)	91,427	85,301	6,126	7.2%
Bank branches	1,271	1,295	(24)	(1.9)%
Automated teller machines (ATMs)	4,368	4,378	(10)	(0.2)%
Period average US$ equivalent of C$1.00 (9)	$ 0.774	$ 0.796	$ (0.022)	(2.8)%
Period-end US$ equivalent of C$1.00	$ 0.734	$ 0.808	$ (0.074)	(9.1)%

(1) Average amounts are calculated using methods intended to approximate the average of the daily balances for the period. This includes average common equity used in the calculation of ROE. For further details, refer to the Key performance and non-GAAP measures section.
(2) See Glossary for composition of this measure.
(3) The LCR and NSFR are calculated in accordance with the Office of the Superintendent of Financial Institutions' (OSFI) Liquidity Adequacy Requirements (LAR) guideline. LCR is the average for the three months ended for each respective period. For further details, refer to the Liquidity and funding risk section.
(4) Capital ratios are calculated using OSFI's Capital Adequacy Requirements (CAR) guideline and the Leverage ratio is calculated using OSFI's Leverage Requirements (LR) guideline.
(5) Effective Q1 2022, OSFI requires Canadian Domestic Systemically Important Banks(D-SIBs) to meet minimum risk-based TLAC ratio and TLAC leverage ratio requirements which are calculated using OSFI's TLAC guideline. For further details, refer to the Capital management section.
(6) Represents year-end spot balances.
(7) AUA includes $15 billion and $6 billion (2021 – $15 billion and $3 billion) of securitized residential mortgages and credit card loans, respectively.
(8) Based on TSX closing market price at period-end.
(9) Average amounts are calculated using month-end spot rates for the period.
n.a. not applicable
n.m. not meaningful

About Royal Bank of Canada

Royal Bank of Canada is a global financial institution with a purpose-driven, principles-led approach to delivering leading performance. Our success comes from the 95,000+ employees who leverage their imaginations and insights to bring our vision, values and strategy to life so we can help our clients thrive and communities prosper. As Canada's biggest bank and one of the largest in the world, based on market capitalization, we have a diversified business model with a focus on innovation and providing exceptional experiences to our 17 million clients in Canada, the U.S. and 27 other countries. Learn more at rbc.com.

Our business segments are described below.

Personal & Commercial Banking	Provides a broad suite of financial products and services in Canada, the Caribbean and the U.S. Our commitment to building and maintaining deep and meaningful relationships with our clients is underscored by the breadth of our product suite, our depth of expertise, and the features of our digital solutions.
Wealth Management	Serves affluent, high net worth (HNW) and ultra-high net worth (UHNW) clients from our offices in key financial centres mainly in Canada, the U.S., the United Kingdom (U.K.), Europe, and Asia. We offer a comprehensive suite of investment, trust, banking, credit and other advice-based solutions. We also provide asset management products to institutional and individual clients through our distribution channels and third-party distributors.
Insurance	Offers a wide range of advice and solutions for individual and business clients including life, health, wealth, home, auto, travel, annuities and reinsurance.
Investor & Treasury Services	Provides asset, payment and treasury services to financial institutions and asset owners worldwide. We are a leader in Canadian cash management and transaction banking services. Trusted with nearly 4 trillion in AUA, our focus is on safeguarding client assets and supporting our clients' growth.
Capital Markets	Provides expertise in advisory & origination, sales & trading, and lending & financing to corporations, institutional clients, asset managers, private equity firms and governments globally. We serve clients from 63 offices in 18 countries across North America, the U.K. & Europe, and Australia, Asia & other regions.
Corporate Support	Corporate Support consists of Technology & Operations, which provides the technological and operational foundation required to effectively deliver products and services to our clients, Functions, which includes our finance, human resources, risk management, internal audit and other functional groups, as well as our Corporate Treasury function.

Vision and strategic goals

Our business strategies and actions are guided by our vision, **"To be among the world's most trusted and successful financial institutions."** Our three strategic goals are:

- In Canada, to be the undisputed leader in financial services;
- In the U.S., to be the preferred partner to corporate, institutional and HNW clients and their businesses; and
- In select global financial centres, to be a leading financial services partner valued for our expertise.

For our progress in 2022 against our business strategies and strategic goals, refer to the Business segment results section.

Economic, market and regulatory review and outlook – data as at November 29, 2022

The predictions and forecasts in this section are based on information and assumptions from sources we consider reliable. If this information or these assumptions are not accurate, actual economic outcomes may differ materially from the outlook presented in this section.

Economic and market review and outlook

Unemployment remains very low across many advanced economies, with labour shortages limiting further increases in production. However, we expect unemployment rates will rise as central banks continue to raise interest rates to contain high inflation, adding to growth headwinds. The U.S. and Canadian economies are expected to undergo moderate recessions in calendar 2023. Recessions in the Euro Area and the United Kingdom (U.K.) have likely already started with higher interest rates adding to surging inflation and disruptions from the war in Ukraine. While global inflation pressures have eased with the price of key commodities and shipping costs declining from peak levels earlier in calendar 2022, inflation pressures have also broadened across a wide array of goods and services. Consumer demand has continued to outpace available supply, and labour shortages have driven wages higher, adding to potentially longer-lasting price pressures. Central banks are responding by increasing interest rates more quickly than previously expected. Higher interest rates, elevated inflation and a decline in the value of equities are reducing household confidence and purchasing power.

Canada
Canadian GDP is expected to increase 3.2% in calendar 2022 following a 4.5% increase in calendar 2021. Output growth in this calendar year has been supported by recovery from the COVID-19 pandemic in the travel and hospitality sectors and increased activity in the oil and gas and mining sectors reflecting higher global commodity prices. Labour market conditions remain tight with elevated job openings and unemployment rates at multi-decade lows. Growth is expected to continue to moderate in the final calendar quarter of 2022 with a moderate recession expected in the first half of calendar 2023. While the unemployment rate is low at 5.2% as of October 2022, it has increased from 4.9% in June and July of 2022. While inflation growth rates have begun to moderate as global supply chain disruptions have eased, and house prices are declining in response to Bank of Canada (BoC) interest rate increases, the inflation rate in October was still high and pressures remain broad-based. The BoC has already increased the overnight rate by 350 basis points since March 2022 and we expect that rate to rise to 4.0% before the end of the calendar year. Rising household debt servicing costs, high consumer price growth, and declining house prices are expected to weaken household confidence and purchasing power over the next calendar year.

U.S.
U.S. GDP is expected to increase 1.8% in calendar 2022 following a 5.9% increase in calendar 2021. Labour markets have remained very strong. However the unemployment rate has begun to increase from lows over the summer and the number of job openings is decreasing. We expect further increases in the unemployment rate over the remainder of calendar 2022 and in calendar 2023. While inflation rates have begun to decrease as global supply chain disruptions ease, and the price of gasoline has declined from higher levels in the spring, price growth remains very high and broad-based. The Federal Reserve (Fed) is responding with continued interest rate hikes. The Fed has already increased the federal funds rate target by 375 basis points since March 2022 and we expect that target range will rise to 4.75% to 5.0% by the end of the first calendar quarter of 2023. Higher interest rates and inflation are reducing household purchasing power, and we expect consumer spending growth to slow with a moderate recession expected in the first half of calendar 2023.

Europe
Euro area GDP is expected to rise by 3.0% in calendar 2022 following a 5.3% increase in calendar 2021. The Euro area economy is expected to have entered a moderate recession in the second half of calendar 2022. The war in Ukraine is having a more direct impact on economies in the Euro area relative to other regions due to stronger direct trade linkages. In addition, inflation in the region is expected to continue to surge higher driven by increased energy costs. Despite a slowing growth outlook, surging inflation is pushing the European Central Bank (ECB) to raise interest rates from exceptionally low negative rates at the beginning of this calendar year. The ECB increased interest rates by 50 bps in July 2022 and another 75 bps in each of September and October 2022. We expect further increases to push the deposit rate to 2.5% by the end of the first calendar quarter of 2023. U.K. GDP is projected to rise by 4.2% in calendar 2022 after a 7.5% increase in calendar 2021. The U.K. is also expected to have entered a recession in the second half of calendar 2022. As inflation in the U.K. has continued to surge, we expect the Bank of England (BoE) to raise interest rates more quickly than previously anticipated to 3.75% by early calendar 2023.

Financial markets
Bond yields have increased substantially from the second calendar quarter of 2022 as central banks respond to high inflation. The spread between longer and shorter duration bond yields, which is a commonly used recession indicator, has narrowed sharply with the spread between 10-year and 2-year yields inverting to negative values in the U.S. and Canada. Equity markets have declined from the beginning of calendar 2022 on a worsening global growth outlook. Global inflation pressures have shown signs of easing and inflation rates may have peaked in some regions such as the U.S. and Canada. However, underlying inflation pressures are not expected to ease to central bank target rates until the economy weakens substantially.

Regulatory environment
We continue to monitor and prepare for regulatory developments and changes in a manner that seeks to ensure compliance with new requirements, while mitigating adverse business or financial impacts. Such impacts could result from new or amended laws or regulations and the expectations of those who enforce them. A high level summary of the key regulatory changes that have the potential to increase or decrease our costs and the complexity of our operations is included in the Legal and regulatory environment risk section of this 2022 Annual Report.

For a discussion on risk factors resulting from these and other developments which may affect our business and financial results, refer to the risk sections of this 2022 Annual Report. For further details on our framework and activities to manage risks, refer to the risk and Capital management sections of this 2022 Annual Report.

Key corporate events of 2022

HSBC Bank Canada
On November 29, 2022, we entered into an agreement to acquire 100% of the common shares of HSBC Bank Canada (HSBC Canada) for an all-cash purchase price of $13.5 billion. In addition, we will purchase all of the existing preferred shares and subordinated debt of HSBC Canada held directly or indirectly by HSBC Holdings plc at par value. HSBC Canada is a premier Canadian personal and commercial bank focused on globally connected clients.

The transaction is expected to close by late 2023 and is subject to the satisfaction of customary closing conditions, including regulatory approvals. For further details, refer to Note 33 of our Consolidated Financial Statements.

Brewin Dolphin Holdings PLC
On September 27, 2022, we completed the acquisition of Brewin Dolphin Holdings PLC (Brewin Dolphin) for total consideration of £1,591 million ($2,341 million) as of the date of close. The results of the acquired business have been consolidated from the closing date and are included in International Wealth Management within our Wealth Management segment. For further details, refer to Note 6 of our Consolidated Financial Statements.

RBC Investor Services
On October 17, 2022, we announced the signing of a Memorandum of Understanding with CACEIS (the asset servicing banking group of Crédit Agricole S.A. and Banco Santander, S.A.) with a view for CACEIS to acquire the European asset servicing activities of RBC Investor Services and its associated Malaysian centre of excellence. The execution of the final agreements between CACEIS and RBC requires prior consultation with the relevant works councils of CACEIS. The completion of the contemplated transaction will be subject to customary closing conditions, including regulatory and antitrust approvals, and is expected to take place by the end of the third calendar quarter of 2023. This transaction will have a de minimus impact on RBC's CET1 ratio and EPS.

Defining and measuring success through total shareholder returns

Our focus is to maximize total shareholder returns (TSR) through the achievement of top half performance compared to our global peer group over the medium-term(3-5 years), which we believe reflects a longer-term view of strong and consistent financial performance.

Maximizing TSR is aligned with our three strategic goals discussed earlier and we believe represents the most appropriate measure of shareholder value creation. TSR is a concept used to compare the performance of our common shares over a period of time, reflecting share price appreciation and dividends paid to common shareholders. The absolute size of TSR will vary depending on market conditions, and the bank's position reflects the market's perception of our overall performance relative to our peers over a period of time.

Financial performance objectives are used to measure our performance against our medium-term TSR objectives and are used as goals as we execute against our strategic priorities. We review and revise these financial performance objectives as economic, market and regulatory environments change.

The following table provides a summary of our 3-year and 5-year performance against our medium-term financial performance objectives:

Financial performance compared to our medium-term objectives — Table 2

Medium-term objectives (1)	**3-year** (2)	**5-year** (2)
Diluted EPS growth of 7% +	**8%**	**8%**
ROE of 16% +	**16.4%**	**16.7%**
Strong capital ratio (CET1) (3)	**12.9%**	**12.5%**
Dividend payout ratio 40% – 50%	**46%**	**46%**

(1) A medium-term (3-5 year) objective is considered to be achieved when the performance goal is met in either a 3- or 5-year period. These objectives assume a normal business environment and our ability to achieve them in a period may be adversely affected by the macroeconomic backdrop.
(2) Diluted EPS growth is calculated using a Compound Annual Growth Rate (CAGR). ROE, CET1 and dividend payout ratio are calculated using an average.
(3) For further details on the CET1 ratio, refer to the Capital management section.

Our 3-year and 5-year medium-term financial performance objectives will remain unchanged in fiscal 2023.

We compare our TSR to that of a global peer group approved by our Board of Directors (the Board). The global peer group consists of the following 9 financial institutions:

- **Canadian financial institutions:** Bank of Montreal, Canadian Imperial Bank of Commerce, Manulife Financial Corporation, National Bank of Canada, The Bank of Nova Scotia, and Toronto-Dominion Bank.
- **U.S. banks:** JPMorgan Chase & Co. and Wells Fargo & Company.
- **International banks:** Westpac Banking Corporation.

Medium-term objectives – 3- and 5-year TSR vs. peer group average — Table 3

	3-year TSR (1)	5-year TSR (1)
Royal Bank of Canada	10%	9%
	Top half	Top half
Peer group average (excluding RBC)	6%	5%

(1) The 3- and 5-year annualized TSR are calculated based on our common share price appreciation as per the TSX closing market price plus reinvested dividends for the period October 31, 2019 to October 31, 2022 and October 31, 2017 to October 31, 2022.

Common share and dividend information — Table 4

For the year ended October 31	**2022**	2021	2020	2019	2018
Common share price (RY on TSX) – close, end of period	**$ 126.05**	$128.82	$ 93.16	$106.24	$ 95.92
Dividends paid per share	**4.96**	4.32	4.26	4.00	3.70
Increase (decrease) in share price	**(2.2)%**	38.3%	(12.3)%	10.8%	(4.9)%
Total shareholder return	**1.6%**	43.8%	(8.4)%	15.2%	(1.0)%

Financial performance

Overview

2022 vs. 2021

Net income of $15,807 million was down $243 million or 2% from last year. Diluted EPS of $11.06 was flat and ROE of 16.4% was down 220 bps. Our CET1 ratio was 12.6%, down 110 bps from last year.

Our earnings reflect lower results in Capital Markets and Insurance, partially offset by higher earnings in Personal & Commercial Banking, Wealth Management, and Investor & Treasury Services. The current year also reflects lower releases of provisions on performing loans.

For further details on our business segment results and CET1 ratio, refer to the Business segment results and Capital management sections, respectively.

Impact of foreign currency translation

The following table reflects the estimated impact of foreign currency translation on key income statement items:

Table 5

(Millions of Canadian dollars, except per share amounts)	2022 vs. 2021
Increase (decrease):	
Total revenue	**$ 165**
PCL	**3**
Non-interest expense	**72**
Income taxes	**8**
Net income	**82**
Impact on EPS	
Basic	**$ 0.06**
Diluted	**0.06**

The relevant average exchange rates that impact our business are shown in the following table:

Table 6

(Average foreign currency equivalent of C$1.00) (1)	2022	2021
U.S. dollar	**0.774**	0.796
British pound	**0.618**	0.579
Euro	**0.727**	0.668

(1) Average amounts are calculated using month-end spot rates for the period.

Total revenue

Table 7

(Millions of Canadian dollars, except percentage amounts)	2022	2021
Interest and dividend income	**$ 40,771**	$ 28,145
Interest expense	**18,054**	8,143
Net interest income	**$ 22,717**	$ 20,002
NIM	**1.48%**	1.48%
Insurance premiums, investment and fee income	**$ 3,510**	$ 5,600
Trading revenue	**926**	1,183
Investment management and custodial fees	**7,610**	7,132
Mutual fund revenue	**4,289**	4,251
Securities brokerage commissions	**1,481**	1,538
Service charges	**1,976**	1,858
Underwriting and other advisory fees	**2,058**	2,692
Foreign exchange revenue, other than trading	**1,038**	1,066
Card service revenue	**1,203**	1,078
Credit fees	**1,512**	1,530
Net gains on investment securities	**43**	145
Share of profit in joint ventures and associates	**110**	130
Other	**512**	1,488
Non-interest income	**$ 26,268**	$ 29,691
Total revenue	**$ 48,985**	$ 49,693

2022 vs. 2021

Total revenue decreased $708 million or 1% from last year, largely due to lower insurance premiums, investment and fee income (Insurance revenue) and other revenue. Lower underwriting and other advisory fees and trading revenue also contributed to the decrease. These factors were partially offset by higher net interest income and investment management and custodial fees.

Net interest income increased $2,715 million or 14%, primarily due to average volume growth and higher spreads in Canadian Banking and Wealth Management.

NIM remained flat, as the benefit to our Canadian Banking and Wealth Management segments from rising interest rates was offset by spread compression in repo products.

Insurance revenue decreased $2,090 million or 37%, mainly due to the change in fair value of investments backing policyholder liabilities and lower group annuity sales, both of which are largely offset in PBCAE. These factors were partially offset by business growth in Canadian Insurance across the majority of our products.

Investment management and custodial fees increased $478 million or 7%, primarily driven by higher average fee-based client assets reflecting net sales.

Trading revenue decreased $257 million or 22%, mainly due to the impact from loan underwriting markdowns, primarily in the U.S., largely driven by challenging market conditions.

Underwriting and other advisory fees decreased $634 million or 24%, mainly attributable to lower debt and equity origination across most regions.

Other revenue decreased $976 million or 66%, primarily attributable to changes in the fair value of the hedges related to our U.S. share-based compensation plans, which was largely offset in Non-interest expense.

Additional trading information

Table 8

(Millions of Canadian dollars)	2022	2021 (2)
Net interest income (1)	$ 2,024	$ 2,230
Non-interest income	926	1,183
Total trading revenue	$ 2,950	$ 3,413
Total trading revenue by product		
Interest rate and credit	$ 1,147	$ 1,904
Equities	951	935
Foreign exchange and commodities	852	574
Total trading revenue	$ 2,950	$ 3,413

(1) Reflects net interest income arising from trading-related positions, including assets and liabilities that are classified or designated at fair value through profit or loss (FVTPL).
(2) Amounts have been revised from those previously presented.

2022 vs. 2021

Total trading revenue of $2,950 million, which is comprised of trading-related revenue recorded in Net interest income and Non-interest income, decreased $463 million or 14% from last year, mainly due to the impact from loan underwriting markdowns, primarily in the U.S., largely driven by challenging market conditions.

Provision for credit losses (1)

Table 9

(Millions of Canadian dollars, except percentage amounts)	For the year ended October 31 2022	October 31 2021
Personal & Commercial Banking	$ (281)	$ (899)
Wealth Management	21	(32)
Capital Markets	(22)	(414)
Corporate Support and other (2)	1	(5)
PCL on performing loans	(281)	(1,350)
Personal & Commercial Banking	$ 755	$ 731
Wealth Management	13	(14)
Capital Markets	13	(39)
Corporate Support and other (2)	(3)	–
PCL on impaired loans	778	678
PCL – Loans	497	(672)
PCL – Other financial assets (3)	(13)	(81)
Total PCL	$ 484	$ (753)
PCL on loans is comprised of:		
Retail	$ (31)	$ (684)
Wholesale	(250)	(666)
PCL on performing loans	(281)	(1,350)
Retail	648	604
Wholesale	130	74
PCL on impaired loans	778	678
PCL – Loans	$ 497	$ (672)
PCL on loans as a % of average net loans and acceptances	0.06%	(0.10)%
PCL on impaired loans as a % of average net loans and acceptances	0.10%	0.10%

(1) Information on loans represents loans, acceptance and commitments.
(2) Includes PCL recorded in Corporate Support, Insurance and Investor & Treasury Services.
(3) PCL on other financial assets mainly represents provisions on debt securities measured at FVOCI and amortized cost, accounts receivable and financial guarantees.

2022 vs. 2021
Total PCL was $484 million compared to $(753) million last year, primarily reflecting lower releases of provisions on performing loans in Personal & Commercial Banking and Capital Markets. The PCL on loans ratio increased 16 bps.

PCL on performing loans was $(281) million, compared to $(1,350) million last year, primarily in Personal & Commercial Banking and Capital Markets, reflecting the recovery from the COVID-19 pandemic in both 2022 and 2021. The releases in the current year were partially offset by unfavourable changes in our macroeconomic outlook.

PCL on impaired loans increased $100 million or 15%, mainly reflecting recoveries last year as compared to provisions taken in the current year in Capital Markets and Wealth Management, as well as higher provisions in Personal & Commercial Banking.

Insurance policyholder benefits, claims and acquisition expense (PBCAE)

2022 vs. 2021
PBCAE of $1,783 million decreased $2,108 million or 54% from last year, mainly reflecting the change in fair value of investments backing policyholder liabilities and lower group annuity sales, both of which are largely offset in revenue. Higher favourable investment-related experience and favourable annual actuarial assumption updates in the current year largely related to economic assumptions also contributed to the decrease. These factors were partially offset by the impact of lower new longevity reinsurance contracts, as well as business growth in Canadian Insurance.

Non-interest expense

Table 10

(Millions of Canadian dollars, except percentage amounts)	2022	2021
Salaries	$ 7,251	$ 6,724
Variable compensation	7,127	7,145
Benefits and retention compensation	2,015	2,053
Share-based compensation	135	617
Human resources	16,528	16,539
Equipment	2,099	1,986
Occupancy	1,554	1,584
Communications	1,082	931
Professional fees	1,511	1,351
Amortization of other intangibles	1,369	1,287
Other	2,466	2,246
Non-interest expense	$ 26,609	$ 25,924
Efficiency ratio (1)	54.3%	52.2%
Efficiency ratio adjusted (2)	52.3%	52.2%

(1) Efficiency ratio is calculated as Non-interest expense divided by Total revenue.
(2) This is a non-GAAP ratio. This measure has been adjusted by excluding the change in fair value of investments backing policyholder liabilities from total revenue. For further details, refer to the Key performance and non-GAAP measures section.

2022 vs. 2021
Non-interest expense increased $685 million or 3% from last year, mainly due to higher staff and technology related costs as well as increased marketing costs and other discretionary spend. These factors were partially offset by the change in the fair value of our U.S share-based compensation plans, which was largely offset in Other revenue.

Our efficiency ratio of 54.3% increased 210 bps from last year. Excluding the change in fair value of investments backing policyholder liabilities, our efficiency ratio of 52.3% increased 10 bps from last year.

Efficiency ratio excluding the change in fair value of investments backing policyholder liabilities is a non-GAAP ratio. For further details, including a reconciliation, refer to the Key performance and non-GAAP measures section.

Income and other taxes

Table 11

(Millions of Canadian dollars, except percentage amounts)	2022	2021
Income taxes	$ 4,302	$ 4,581
Other taxes		
Value added and sales taxes	508	443
Payroll taxes	871	810
Capital taxes	90	73
Property taxes	129	140
Insurance premium taxes	31	31
Business taxes	72	39
	1,701	1,536
Total income and other taxes	$ 6,003	$ 6,117
Income before income taxes	$ 20,109	$ 20,631
Effective income tax rate	21.4%	22.2%
Effective total tax rate (1)	27.5%	27.6%

(1) Total income and other taxes as a percentage of income before income taxes and other taxes.

2022 vs. 2021
Income tax expense decreased $279 million or 6% from last year, primarily due to lower income before income taxes, an increase in income from lower tax rate jurisdictions and higher tax-exempt income in the current year.

The effective income tax rate of 21.4% decreased 80 bps, primarily due to higher tax-exempt income and an increase in income from lower tax rate jurisdictions in the current year.

Other taxes increased $165 million or 11% from last year, mainly due to higher value added and sales taxes commensurate with increased purchase activity, higher payroll taxes driven by higher staff-related costs, as well as an increase in business taxes.

Client assets

Assets under administration
AUA are assets administered by us which are beneficially owned by our clients. We provide services that are administrative in nature, including safekeeping, collecting investment income, settling purchase and sale transactions, and record keeping. Underlying investment strategies within AUA are determined by our clients and generally do not impact the administrative fees that we receive. Administrative fees can be impacted by factors such as asset valuation level changes from market movements, types of services administered, transaction volumes, geography and client relationship pricing based on volumes or multiple services.

Our Investor & Treasury Services business is the primary business segment that has AUA with approximately 69% of total AUA, as at October 31, 2022, followed by our Wealth Management and Personal & Commercial Banking businesses with approximately 25% and 6% of total AUA, respectively.

2022 vs. 2021
AUA decreased $698 billion or 11% from last year, primarily due to unfavourable market conditions, partially offset by increased client activity in Investor & Treasury Services, the impact of foreign exchange translation and the inclusion of our acquisition of Brewin Dolphin in Wealth Management.

The following table summarizes AUA by geography and asset class:

AUA by geographic mix and asset class — Table 12

(Millions of Canadian dollars)	2022	2021
Canada (1)		
Money market	**$ 43,200**	$ 42,700
Fixed income	**735,800**	772,400
Equity	**734,000**	781,400
Multi-asset and other	**1,006,300**	1,150,400
Total Canada	**2,519,300**	2,746,900
U.S. (1)		
Money market	**40,700**	49,800
Fixed income	**116,000**	90,400
Equity	**246,300**	256,000
Multi-asset and other	**304,300**	324,600
Total U.S.	**707,300**	720,800
Other International (1)		
Money market	**38,200**	32,800
Fixed income	**252,700**	308,200
Equity	**636,600**	865,000
Multi-asset and other	**1,495,600**	1,673,600
Total International	**2,423,100**	2,879,600
Total AUA	**$ 5,649,700**	$ 6,347,300

(1) Geographic information is based on the location from where our clients are serviced.

Assets under management
AUM are assets managed by us which are beneficially owned by our clients. Management fees are paid by the investment funds and other clients for the investment capabilities of an investment manager and can also cover administrative services. Management fees may be calculated daily, monthly or quarterly as a percentage of the AUM, depending on the distribution channel, product and investment strategies. In general, equity strategies carry a higher fee rate than fixed income or money market strategies. Fees are also impacted by asset mix and relationship pricing for clients using multiple services. Higher risk assets generally produce higher fees, while clients using multiple services can take advantage of synergies which reduce the fees they are charged. Certain funds may have performance fee arrangements where fees are recorded when certain benchmarks or performance targets are achieved. These factors could lead to differences in fees earned by product and therefore net return by asset class may vary despite similar average AUM. Our Wealth Management segment is the primary business segment that has AUM with approximately 99% of total AUM as at October 31, 2022.

2022 vs. 2021
AUM decreased $9 billion or 1% from last year, primarily due to unfavourable market conditions, partially offset by the inclusion of our acquisition of Brewin Dolphin, the impact of foreign exchange translation and net sales.

The following table presents the change in AUM for the year ended October 31, 2022:

Client assets – AUM — Table 13

(Millions of Canadian dollars)	2022 Money market	Fixed income	Equity	Multi-asset and other	Total	2021 Total
AUM, beginning balance	$ 43,500	$ 235,400	$ 137,600	$ 592,200	$ 1,008,700	$ 843,600
Institutional inflows	100,000	42,900	16,100	16,600	175,600	98,000
Institutional outflows	(107,300)	(48,900)	(10,600)	(13,200)	(180,000)	(73,700)
Personal flows, net	(700)	(2,900)	2,000	23,000	21,400	51,500
Total net flows	(8,000)	(8,900)	7,500	26,400	17,000	75,800
Market impact	200	(27,400)	(18,100)	(72,100)	(117,400)	123,800
Acquisition/dispositions	–	–	–	58,500	58,500	(4,500)
Foreign exchange	2,100	(1,300)	2,900	29,200	32,900	(30,000)
Total market, acquisition/dispositions and foreign exchange impact	2,300	(28,700)	(15,200)	15,600	(26,000)	89,300
AUM, balance at end of year	$ 37,800	$ 197,800	$ 129,900	$ 634,200	$ 999,700	$ 1,008,700

Business segment results

Results by business segments

Table 14

(Millions of Canadian dollars, except percentage amounts)	2022 Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	2021 Total
Net interest income	$ 14,019	$ 3,634	$ –	$ 498	$ 4,698	$ (132)	$ 22,717	$ 20,002
Non-interest income	6,124	11,215	3,510	1,725	4,422	(728)	26,268	29,691
Total revenue	20,143	14,849	3,510	2,223	9,120	(860)	48,985	49,693
PCL	463	34	–	(3)	(11)	1	484	(753)
PBCAE	–	–	1,783	–	–	–	1,783	3,891
Non-interest expense	8,437	10,701	588	1,569	5,561	(247)	26,609	25,924
Income before income taxes	11,243	4,114	1,139	657	3,570	(614)	20,109	20,631
Income taxes	2,873	970	282	144	649	(616)	4,302	4,581
Net income	$ 8,370	$ 3,144	$ 857	$ 513	$ 2,921	$ 2	$ 15,807	$ 16,050
ROE (2)	30.9%	16.5%	36.4%	16.4%	11.3%	n.m.	16.4%	18.6%
Average assets	$ 575,900	$ 158,100	$ 22,500	$ 250,600	$ 824,800	$ 55,000	$ 1,886,900	$ 1,678,200

(1) Net interest income, Non-interest income, Total revenue, Income before income taxes, and Income taxes are presented in Capital Markets on a taxable equivalent basis (teb). The teb adjustment is eliminated in the Corporate Support segment. For a further discussion, refer to the How we measure and report our business segments section.
(2) For further details, refer to the Key performance andnon-GAAP measures section.
n.m. not meaningful

How we measure and report our business segments

Our management reporting framework is intended to measure the performance of each business segment as if it were a stand-alone business and reflects the way that the business segment is managed. This approach is intended to ensure that our business segments' results include all applicable revenue and expenses associated with the conduct of their business and depicts how management views those results.

Key methodologies
The following outlines the key methodologies and assumptions used in our management reporting framework. These are periodically reviewed by management to ensure they remain valid.

Expense and tax allocation
To ensure that our business segments' results include expenses associated with the conduct of their business, we allocate costs incurred or services provided by Technology & Operations and Functions, which are directly undertaken or provided on the business segments' behalf. For other costs not directly attributable to our business segments, including overhead costs and other indirect expenses, we use our management reporting framework for allocating these costs to each business segment in a manner that is intended to reflect the underlying benefits.

Capital attribution
Our management reporting framework also determines the attribution of capital to our business segments in a manner that is intended to consistently measure and align economic costs with the underlying benefits and risks associated with the activities of each business segment. The amount of capital assigned to each business segment is referred to as attributed capital. Unattributed capital and associated amounts are reported in Corporate Support. For further information, refer to the Capital management section.

Funds transfer pricing
Funds transfer pricing refers to the pricing of intra-company borrowing or lending for management reporting purposes. We employ a funds transfer pricing process to enable risk-adjusted management reporting of segment results. This process determines the costs and revenue for intra-company borrowing and lending of funds after taking into consideration our interest rate risk and liquidity risk management objectives, as well as applicable regulatory requirements.

Provisions for credit losses
PCL is recorded to recognize expected credit losses on all financial assets, except for financial assets classified or designated as FVTPL and equity securities designated as FVOCI, which are not subject to impairment assessment. For details on our accounting policy on Allowance for credit losses (ACL), refer to Note 2 of our 2022 Annual Consolidated Financial Statements.

PCL is included in the results of each business segment to fully reflect the appropriate expenses related to the conduct of each business segment.

In addition to the key methodologies described above, the following components of our management reporting framework also impact how our business segments are managed and reported:

- Wealth Management results include disclosure in U.S. dollars, primarily for U.S. Wealth Management (including City National) as we review and manage the results of this business largely in this currency.
- Capital Markets results are reported on a teb basis, which grosses up total revenue from certain tax-advantaged sources (Canadian taxable corporate dividends and the U.S. tax credit investment business) to their effective taxable equivalent value with a corresponding offset recorded in the provision for income taxes. We record the elimination of the teb adjustments in Corporate Support. We believe these adjustments are useful and reflect how Capital Markets manages its business, since it enhances the comparability of revenue and related ratios across taxable revenue and our principal tax-advantaged sources of revenue. The use of teb adjustments and measures may not be comparable to similar GAAP measures or similarly adjusted amounts disclosed by other financial institutions.
- Corporate Support results include all enterprise level activities that are undertaken for the benefit of the organization that are not allocated to our five business segments, such as certain treasury and liquidity management activities, including amounts associated with unattributed capital, and consolidation adjustments, including the elimination of the teb gross-up amounts. In addition, we record gains (losses) on economic hedges of our U.S. Wealth Management (including City National) share-based compensation plans, which are reflected in revenue, and related variability in share-based compensation expense driven by changes in the fair value of liabilities relating to these plans in Corporate Support as we believe this presentation more closely aligns with how we view business performance and manage the underlying risks.

Key performance and non-GAAP measures

Performance measures
We measure and evaluate the performance of our consolidated operations and each business segment using a number of financial metrics, such as net income and ROE. Certain financial metrics, including ROE, do not have a standardized meaning under generally accepted accounting principles (GAAP) and may not be comparable to similar measures disclosed by other financial institutions.

Return on common equity
We use ROE, at both the consolidated and business segment levels, as a measure of return on total capital invested in our business. Management views the business segment ROE measure as a useful measure for supporting investment and resource allocation decisions because it adjusts for certain items that may affect comparability between business segments and certain competitors.

Our consolidated ROE calculation is based on net income available to common shareholders divided by total average common equity for the period. Business segment ROE calculations are based on net income available to common shareholders divided by average attributed capital for the period. For each segment, average attributed capital includes the capital required to underpin various risks as described in the Capital management section and amounts invested in goodwill and intangibles.

The attribution of capital involves the use of assumptions, judgments and methodologies that are regularly reviewed and revised by management as deemed necessary. Changes to such assumptions, judgments and methodologies can have a material effect on the business segment ROE information that we report. Other companies that disclose information on similar attributions and related return measures may use different assumptions, judgments and methodologies.

Table of Contents

Calculation of ROE — Table 15

(Millions of Canadian dollars, except percentage amounts)	2022 Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	2022 Total	2021 Total
Net income available to common shareholders	$ 8,287	$ 3,096	$ 851	$ 505	$ 2,855	$ (47)	$ 15,547	$ 15,781
Total average common equity (1), (2)	26,800	18,800	2,350	3,100	25,350	18,300	94,700	84,850
ROE (3)	30.9%	16.5%	36.4%	16.4%	11.3%	n.m.	16.4%	18.6%

(1) Total average common equity represents rounded figures.
(2) The amounts for the segments are referred to as attributed capital.
(3) ROE is based on actual balances of average common equity before rounding.
n.m. not meaningful

Non-GAAP measures

We believe that certain non-GAAP measures described below are more reflective of our ongoing operating results and provide readers with a better understanding of management's perspective on our performance. These measures also enhance the comparability of our financial performance for the year ended October 31, 2022 with the results from last year. Non-GAAP measures (including non-GAAP ratios) do not have a standardized meaning under GAAP and may not be comparable to similar measures disclosed by other financial institutions.

The following discussion describes the non-GAAP measures we use in evaluating our operating results.

Adjusted efficiency ratio

Our efficiency ratio is impacted by the change in fair value of investments backing policyholder liabilities, which is reported in revenue and largely offset in PBCAE. The adjusted efficiency ratio is a non-GAAP ratio and is calculated using adjusted total revenue, which is a non-GAAP measure as it excludes the impact from the change in fair value of investments backing policyholder liabilities. We believe the adjusted efficiency ratio is a useful measure as changes in the fair value of investments backing policyholder liabilities can lead to volatility in total revenue that could obscure trends in underlying business performance and reduce comparability with prior periods.

Consolidated non-GAAP efficiency ratio — Table 16

(Millions of Canadian dollars, except percentage amounts)	2022 As reported	2022 Item excluded: Change in fair value of investments backing policyholder liabilities	2022 Adjusted	2021 As reported	2021 Item excluded: Change in fair value of investments backing policyholder liabilities	2021 Adjusted
Total revenue	$48,985	$ 1,888	$ 50,873	$ 49,693	$ 13	$ 49,706
Non-interest expense	26,609	–	26,609	25,924	–	25,924
Efficiency ratio	54.3%		52.3%	52.2%		52.2%

Personal & Commercial Banking

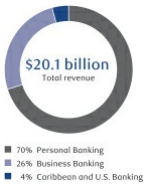
Personal & Commercial Banking provides a broad suite of financial products and services to individuals and businesses for their day-to-day banking, investing and financing needs. We are focused on building deep and meaningful relationships with our clients, underscored by the delivery of exceptional client experiences, the breadth of our product suite, our depth of expertise, and the features of our digital solutions.

> 14 million
Number of Canadian Banking clients

#1 or #2
Ranking in market share for all key retail and business products

38,450
Employees

Revenue by business lines



70% Personal Banking
26% Business Banking
4% Caribbean and U.S. Banking

We operate through two businesses – Canadian Banking and Caribbean & U.S. Banking. Canadian Banking serves our home market in Canada. We have the largest branch network, the most ATMs, one of the largest mobile sales forces across Canada along with market-leading digital capabilities. In Caribbean & U.S. Banking, we offer a broad range of financial products and services in targeted markets.

In Canada, we compete with other Schedule 1 banks, independent trust companies, foreign banks, credit unions, caisses populaires, auto financing companies, as well as emerging entrants to the financial services industry.

In the Caribbean, our competition includes banks, trust companies and investment management companies serving retail and corporate clients, as well as public institutions. In the U.S., we compete primarily with other Canadian banking institutions that have U.S. operations.

2022 Operating environment

- In the early part of the fiscal year, the operating environment continued to be impacted by COVID-19 related restrictions; however, it was buffered in part by low unemployment levels, sustained GDP growth and government support. As restrictions eased during the year, client activity improved, driving solid revenue growth in fiscal 2022.
- In response to rising inflation, the BoC raised the benchmark interest rate by 350 basis points from March 2022 to October 2022. As a result of the rising interest rate environment, we saw NIM expansion in fiscal 2022, reversing the decline in the prior year. The combination of strong volumes and higher NIM translated to significant growth in net interest income.
- While the credit environment in fiscal 2022 reflected a recovery from the COVID-19 pandemic, it also reflected unfavourable changes in our economic outlook towards the latter half of the year, including the impact of slowing economic growth as well as rising inflation and interest rates. PCL on impaired loans remained well below pre-pandemic levels.
- As a result of the rising rate environment, housing activity has slowed and household debt servicing costs increased. In the latter half of the year, we saw mortgage originations below prior year levels.
- Personal and business deposits continued to see significant growth in the first half of the year as COVID-19 related disruptions persisted; however, as a result of the economy re-opening and robust client activity, as well as the impact from Bank of Canada's monetary policy, deposit growth decelerated in the latter half of the fiscal year but remained well above pre-pandemic levels.
- In fiscal 2022, we saw unfavourable market conditions driving mutual fund balances lower from both market depreciation and net redemptions. We also saw a decline in client activity in our Direct Investing business from elevated levels in the previous year.
- Client preferences for digital offerings are evolving and we continue to invest in digital solutions to improve the client experience and deliver personalized advice.
- Our Caribbean Banking business was favourably impacted by the recovery from the COVID-19 pandemic, reflecting higher client activity. We also saw releases of provisions on performing and impaired loans.
- In the U.S., earnings were favourably impacted by the rising interest rate environment and the increase in cross-border travel, as most restrictions related to COVID-19 were lifted.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2022	PRIORITIES IN 2023
Transform sales, advice and services	Evolved our branch network by opening new format branches and investing in upgrading existing locations with the objective of enhancing the client experience, allowing clients to engage in deeper conversations with our advisors and enabling them to complete more transactions digitally Continued to create capacity and capability to focus on advice, complex servicing and sales, all underpinned by innovation across our distribution network Leveraged our industry-leading Canadian mobile app to revolutionize the mobile client experience through personalization and value-added client insights Continued to tailor advice and insights to the individual to help clients manage their finances through the NOMI suite of capabilities, including NOMI Insights®, NOMI Find & Save ® that uses predictive technology to help clients save, and NOMI® Forecast that provides a seven-day forecast of clients' future cash flow In May 2022, Retail Banker International awarded RBC with the Best Global Retail Bank and Best Bank for Small & Medium-Sized enterprises (SMEs) awards, recognizing the Bank's success in respect of its retail banking profits, world-class cost-income ratio, continued market share gains and exceptional client base In October 2022, J.D. Power Canada ranked RBC the highest in Customer Satisfaction among Big 5 Banks for the third consecutive year from the J.D. Power 2022 Canada Retail Banking Satisfaction Study In November 2021, RBC was awarded the Best Payments Innovation Award from The Digital Banker as part of the Global Retail Banking Innovation Awards 2021 Leveraged our existing product portfolio to support our clients' transition to net zero, including lending such as electric and hybrid vehicles and energy retrofit loans, and ESG investment products including market-linked ESG GIC, InvestEase® responsible investing portfolio and RBC Vision funds Continued to grow our national cleantech practice through RBCx and worked with a number of cleantech ecosystem partners to identify and overcome the hurdles to commercialization of cleantech solutions	Provide flexibility by continuing to deliver anytime, anywhere solutions to our clients across all channels, seamlessly integrating mobile and digital services into our clients' lives Continue to reimagine our branch network to meet the evolving needs of our clients Expand our expert advisor network to support clients with complex advice needs Continue to focus on opportunities to support businesses and retail clients in their transition to net zero, including building upon our existing portfolio of products, services and advice Continue to utilize and transform our joint venture Moneris to deliver a leading merchant platform
Accelerate our growth	Own® has launched more than 32,800 new Canadian businesses, driving close to 21,600 small business RBC bank accounts this year Since the launch of the full product offering in August 2021, Mydoh has reached 100,000 Canadian parents and children and is experiencing very high engagement Continued to provide superior working capital solutions to our business clients through RBC PayEdge™ platform Lead with RBC Vantage ™, a program that allows clients to unlock rewards, savings, insights and more with any eligible bank account. Approximately 2 million clients signed up for RBC Vantage since launch and we've delivered millions in fee rebates and over 1 billion RBC Avion® points Launched Vantage Snapshot ™ that provides clients with a personalized picture of the cumulative savings and benefits they've received with their RBC bank accounts and highlights opportunities for clients to earn and save more – all in one spot Launched our next-generation loyalty program, Avion Rewards ™, that provides Canadians with more ways to shop, earn, save and redeem with innovative shopping features, best-in-class cash back deals and offers, and more ways to pay with points Maintained our focus on key high-growth and high-value segments such as retirees, youth, newcomers, business owners, high net worth clients, and healthcare professionals Entered into a collaboration agreement with ICICI Bank Canada to focus on building banking solutions that simplify the financial transition for newcomers from the time they choose Canada to their arrival and beyond	Continue to build a suite of best-in-class value propositions, digital experiences and Beyond Banking ventures to accelerate client acquisition Engage Canadians earlier, more often and in more compelling ways Focus on engaging key high-growth client segments and enabling our advisors to build new and deeper relationships with the objective of achieving industry-leading volume growth Establish additional key partnerships to continue to add value for our clients Enable unparalleled value for both consumers and merchants through best-in-class loyalty program Focus on increasing employee engagement and continue to build a future-ready workforce

OUR STRATEGY	PROGRESS IN 2022	PRIORITIES IN 2023
Digitize to unlock productivity	Achieved 11% year over year growth in number of mobile users Recognized with the J.D. Power Canada award for "Best in Customer Satisfaction" for our mobile banking app. The recognition comes from the J.D. Power 2022 Canadian Banking Mobile App Satisfaction Study Continued to invest in solutions that simplify, digitize and automate experiences for clients and employees, and enable employees to deliver relevant and expert advice, such as our market-leading MyAdvisor® personalized planning capability Enhanced digital experience for our small business and commercial clients and made it easier for them to transact with us Entered into agreements with Plaid and Envestnet | Yodlee that allow RBC clients to better manage their finances and build wealth by securely connecting to and sharing their RBC financial information with thousands of third-party applications	Deliver more personalized insights to improve the client experience while continuing to simplify and digitize everyday banking Lead in mobile capabilities and enable fulfillment of servicing through digital channels with access to advisors to help clients on their chosen path Invest in new tools and capabilities and proactively seek ways to streamline internal processes and the client experience Accelerate adoption of business agility and deliver faster, smarter and higher quality products and solutions
In the Caribbean	Accelerated actions focused on enhancing the client experience underpinned by programs across growth and transformation priorities, including product development and digitization	Continue focus on modernizing data and technology; enhancing the client experience by digitizing and simplifying day to day banking; and developing and accelerating key programs to enable employees for success and accelerate growth
In the U.S.	Despite lingering impacts of the COVID-19 pandemic, continued to drive accelerated client and real estate financing growth leveraging a competitively differentiated value proposition and home-buying solution Made focused investments to digitize client and internal processes within real estate financing, improving process robustness and control automation, and expanding targeted discounts and offers of value to the cross-border lifestyle	Continue driving accelerated growth momentum through deeper integration to increase market share of Canadian purchasers of U.S. real estate and new-to-RBC relationship acquisition Expand digitally enabled client experiences to extend competitive differentiation and drive industry leading client satisfaction, while accelerating automation of operational processes and controls to enhance scalability

Outlook

Interest rate hikes by central banks to contain surging inflation are adding to global growth risk in the year ahead. Housing markets in Canada have already pulled back signficantly since spring in response to increases in interest rates. Labour market conditions are extremely tight with demand for workers well outpacing available supply, leading to shortages across regions and sectors. However, as the economic backdrop deteriorates we expect job openings will fall and unemployment rates will rise. We expect moderate recessions in the U.S. and Canada in the first half of calendar 2023 with consumer spending contracting as higher borrowing costs and prices reduce household purchasing power. We expect the economy will begin to grow again in the second half of calendar 2023 with slowing inflation allowing central banks to pause interest rate hikes in the coming months. We will continue to pursue industry-leading outcomes and operational efficiency initiatives during uncertain times, and channel transformation to achieve our vision of being a digitally-enabled relationship bank.

The Caribbean's economic recovery has continued to strengthen in calendar 2022, supported by strong tourism-related travel. However, a slowing of the growth momentum is expected in 2023 as major source markets (U.S., U.K., Canada, Europe) are projected to fall into recessions. We will continue to focus on growth strategies in our target markets, improving operational efficiency, and adding value for our clients.

For further details on our general economic review and outlook, refer to the Economic, market and regulatory review and outlook section.

Personal & Commercial Banking — Table 17

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2022	2021
Net interest income	$ 14,019	$ 12,621
Non-interest income	6,124	5,725
Total revenue	20,143	18,346
PCL on performing assets	(283)	(909)
PCL on impaired assets	746	722
PCL	463	(187)
Non-interest expense	8,437	7,978
Income before income taxes	11,243	10,555
Net income	$ 8,370	$ 7,847
Revenue by business		
Canadian Banking	$ 19,282	$ 17,570
Personal Banking	13,957	13,337
Business Banking	5,325	4,233
Caribbean & U.S. Banking	861	776
Key ratios		
ROE	30.9%	32.0%
NIM	2.55%	2.51%
Efficiency ratio	41.9%	43.5%
Operating leverage (1)	4.0%	3.1%
Selected balance sheet information		
Average total assets	$ 575,900	$ 527,100
Average total earning assets, net	548,900	502,000
Average loans and acceptances, net	553,300	505,600
Average deposits	552,100	504,300
Other information		
AUA (2), (3)	$ 336,400	$ 367,700
Average AUA	355,600	340,800
AUM (3)	5,600	5,400
Number of employees (FTE)	38,450	36,675
Credit information		
PCL on impaired loans as a % of average net loans and acceptances	0.14%	0.14%
Other selected information – Canadian Banking		
Net income	$ 8,024	$ 7,620
NIM	2.54%	2.50%
Efficiency ratio	40.5%	42.0%
Operating leverage	3.8%	2.9%

(1) See Glossary for composition of this measure.

(2) AUA includes securitized residential mortgages and credit card loans as at October 31, 2022 of $15 billion and $6 billion, respectively (October 31, 2021 – $15 billion and $3 billion).

(3) Represents year-end spot balances.

Financial performance

2022 vs. 2021

Net income increased $523 million or 7% from last year, primarily attributable to higher net interest income, driven by average volume growth of 9% in Canadian Banking and higher spreads. Higher non-interest income also contributed to the increase. These factors were partially offset by higher PCL, higher staff and technology related costs, including digital initiatives.

Total revenue increased $1,797 million or 10%, primarily due to higher net interest income reflecting average volume growth in Canadian Banking of 9% in loans and 9% in deposits. Increased client activity contributed to higher foreign exchange revenue, card service revenue and service charges.

NIM increased 4 bps, primarily due to the impact of the rising interest rate environment, partially offset by changes in product mix and lower prepayment revenue in our mortgage portfolios.

PCL was $463 million compared to $(187) million last year. The increase in PCL was primarily attributable to lower releases of provisions on performing loans due to unfavourable changes in our macroeconomic outlook in the current year.

Non-interest expense increased $459 million or 6%, mainly attributable to higher staff and technology related costs, including digital initiatives, as well as higher marketing costs.

Average loans and acceptances increased $48 billion or 9%, mainly driven by growth in residential mortgages and business loans.

Average deposits increased $48 billion or 9%, reflecting growth in business deposits and personal deposits including Guaranteed Investment Certificates (GICs).

Business line review

In Canada, we operate through two business lines: Personal Banking and Business Banking.

Personal Banking

Personal Banking offers a full range of products focused on meeting the needs of our individual Canadian clients at every stage of their lives through a wide range of financing and investment products and services. This includes home equity financing, personal lending, chequing and savings accounts, private banking, indirect lending (including auto financing), mutual funds and self-directed brokerage accounts, GICs, credit cards, and payment products and solutions.

We rank #1 or #2 in market share for all key Personal Banking products in Canada supported by the largest retail banking network in Canada, with 1,162 branches and 4,028 ATMs.

Financial performance

Total revenue increased $620 million or 5% compared to last year, primarily due to higher net interest income reflecting average volume growth of 9% and higher interest rates, partially offset by the impact of competitive pricing in our mortgage portfolios. Increased client activity also contributed to higher card service revenue, foreign exchange revenue and service charges. These factors were partially offset by lower securities brokerage commissions.

Average residential mortgages increased 11% compared to last year, mainly due to solid, but moderating, housing activity and mortgage originations.

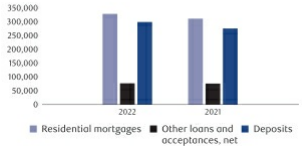
Average deposits increased 9% from last year, largely reflecting acquisition of new clients and an increase in activity from existing clients.

Selected highlights — Table 18

(Millions of Canadian dollars, except number of)	2022	2021
Total revenue	**$ 13,957**	$ 13,337
Other information		
Average residential mortgages	**338,400**	305,400
Average other loans and acceptances, net	**75,700**	74,800
Average deposits	**293,500**	270,500
Average credit card balances	**18,200**	16,600
Credit card purchase volumes	**162,200**	132,400
Branch mutual fund balances (1)	**178,600**	205,500
Average branch mutual fund balances	**194,400**	191,300
AUA – Self-directed brokerage (1)	**127,600**	135,900
Number as at October 31:		
Branches	**1,162**	1,182
ATMs	**4,028**	4,032

(1) Represents year-end spot balances.

Average residential mortgages, loans and deposits
(Millions of Canadian dollars)



Business Banking

Business Banking offers a wide range of lending, leasing, deposit, investment, foreign exchange, cash management, auto dealer financing, trade products, and services to small and medium-sized commercial businesses across Canada. With one of the largest teams of relationship managers and specialists in the industry, our commitment to client experience and trusted advice has earned us leading market share in business lending and deposits.

Financial performance

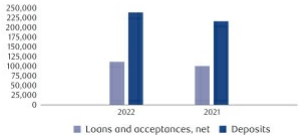
Total revenue increased $1,092 million or 26% compared to last year, primarily due to higher net interest income reflecting higher interest rates and average volume growth of 11%. Higher credit fees, service charges and foreign exchange revenue reflecting increased client activity also contributed to the increase.

Average loans and acceptances increased 11% and average deposits increased 11%, mainly due to new account acquisitions as well as deepening of our existing client relationships.

Selected highlights — Table 19

(Millions of Canadian dollars)	2022	2021
Total revenue	**$ 5,325**	$ 4,233
Other information (average)		
Loans and acceptances, net	**110,800**	99,800
Deposits	**237,900**	215,200

Average loans and acceptances and deposits
(Millions of Canadian dollars)



Caribbean & U.S. Banking

Our Caribbean Banking business offers a comprehensive suite of banking products and services, as well as international financing and trade promotion services through extensive branch, ATM, online, and mobile banking networks.

Our U.S. Banking business serves the needs of Canadian retail and small business clients providing personalized, digitally-enabled cross-border banking solutions enabling a cross-border lifestyle in all 50 states across the U.S.

Financial performance
Total revenue increased $85 million or 11% from last year, primarily due to higher net interest income reflecting average volume growth of 12% and higher spreads. Higher card service revenue reflecting increased client activity also contributed to the increase.

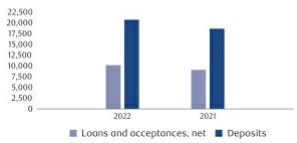
Average loans and acceptances increased 12% and average deposits increased 11% primarily due to increased client activity and the impact of foreign exchange translation.

Selected highlights — Table 20

(Millions of Canadian dollars, except number of and percentage amounts)	2022	2021
Total revenue	**$ 861**	$ 776
Other information		
NIM	**2.90%**	2.85%
Average loans and acceptances, net	**10,200**	9,100
Average deposits	**20,800**	18,700
AUA (1)	**6,500**	5,700
Average AUA	**6,300**	5,700
AUM (1)	**5,300**	5,100
Number as at October 31:		
Branches	**38**	38
ATMs	**269**	271

(1) Represents year-end spot balances.

Average loans and deposits (Millions of Canadian dollars)



Wealth Management

Wealth Management is a global business serving clients in key financial centres. We serve HNW and UHNW individual and institutional clients with a comprehensive suite of advice-based solutions and strategies to help them achieve their financial goals.

$14.8 billion
Total revenue

> 6,100
Client-facing advisors

> $55 billion
AUA net flows

Asset under Administration (AUA)



Assets under Management (AUM)

Our lines of business include Canadian Wealth Management, U.S. Wealth Management (including City National), Global Asset Management (GAM), and International Wealth Management.

- Canadian Wealth Management is the largest full-service wealth advisory business in Canada, as measured by AUA, serving HNW and UHNW clients
- U.S. Wealth Management (including City National) also encompasses our private client group (PCG) and clearing and custody (C&C) businesses. PCG is the 6th largest full-service wealth advisory firm in the U.S., as measured by AUA, and City National is a premier U.S. private and commercial bank serving HNW, UHNW and commercial clients
- GAM is the largest retail mutual fund company in Canada as measured by AUM, as well as a leading institutional asset manager
- International Wealth Management serves HNW and UHNW clients, primarily through key financial centres in the U.K., Ireland, the Channel Islands and Asia

2022 Operating environment

- Earnings in the current fiscal year were favourably impacted by the rising interest rate environment reflecting rate hikes by the Fed, BoC and other central banks, while challenging market conditions unfavourably impacted our fee-based client assets.
- Our core businesses performed well with continued volume growth in City National and net positive flows of fee-based client assets in our wealth advisory businesses reflecting the strength of our business driven by the quality of our advice, the breadth of our investment and holistic wealth planning solutions and clients' trust in our brand. The mutual fund sector has seen a slowdown in sales due to the rising interest rate environment and market volatility.
- We continued to invest in our people and technology to maintain our competitive advantage and increase efficiencies in an environment characterized by market volatility, rapidly changing client preferences and increasing regulatory requirements.
- While the credit environment in fiscal 2022 reflected a recovery from the COVID-19 pandemic, it also reflected unfavourable changes in our economic outlook towards the latter half of the year, including the impact of slowing economic growth as well as rising inflation and interest rates.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2022	PRIORITIES IN 2023
In Canada, be the premier service provider for HNW and UHNW clients	Further extended our position as industry leader in our full-service private wealth business Continued to focus on holistic wealth planning, including advisor training on intergenerational and business wealth transfer Continued to expand RBC ® Premier Banking to deepen banking relationships with Wealth Management clients Continued to enhance our digital and data capabilities to drive increased client satisfaction and advisor productivity Implemented unique capabilities that are becoming increasingly important to our client base such as private alternative investment products	Continue to retain and attract top-performing advisors to strengthen our talent advantage Deliver a differentiated client experience through enriched advisor-client interactions and seamless digital experiences Deepen client relationships by leveraging the combined strengths across other business segments with a focus on the business owner client segment Continue to invest in digital solutions to streamline and simplify the business and improve efficiency and advisor productivity Renew legacy infrastructure to ensure ongoing resiliency in our technology platforms
In the U.S., become the leading private and commercial bank and wealth manager in our key markets	Continued to invest in key areas needed to grow our U.S. Wealth Management business, including substantial financial advisor recruitment, solid execution on our technology transformation and provided proactive liquidity to our clients via a revamped securities-based lending platform In City National, we continued to focus on organically growing our core-banking business and enhancing our risk management and controls foundation As part of the Preferred Banking mortgage-led strategy, City National launched a pilot mortgage pod program designed to attract new clients with a mortgage-led strategy The National Corporate Banking division, which was launched in 2021 to pursue the mid-Corp segment (companies with annual revenue from $500 million to $2 billion), gained market share in 2022	Continue to deliver an exceptional client experience for targeted HNW, UHNW, middle market, and business banking segments Leverage the combined strengths within U.S. Wealth Management (including City National) and Capital Markets to deepen client relationships In City National, we will continue to focus on enhancing our risk management and compliance capabilities across the three lines of defense Serve our clients more effectively through a technology-driven platform, for example, transforming our end-to-end commercial credit journey leveraging a new commercial lending platform, strengthening the mortgage platform by modernizing technology and enhancing our client-facing digital capabilities Drive programs to enhance profitability and scalability across the organization
In select global financial centres, become the most trusted regional private bank	Continued to deliver on successful growth initiatives, bringing the full strength and breadth of RBC to our clients Focused on delivering a differentiated client experience by leveraging our global capabilities Completed acquisition of Brewin Dolphin, increasing our distribution, AUM and client base to position ourselves as the third largest wealth manager in the U.K. In Asia, continued growth momentum achieved through the addition of experienced client-facing advisors and net new assets	Focus on growing market share in target markets Continue to leverage our global strengths to better serve clients Continue to deliver an exceptional client experience and increase business effectiveness and talent capabilities Successful integration of RBC Brewin Dolphin to enhance client value proposition and consolidate position in the U.K. local market Focus on growing the business in Asia by attracting experienced advisors; enhancing digital and product capabilities; and deepening cross-business, global collaboration
In asset management, be a leading, diversified asset manager focused on global institutional and North American retail clients	Maintained #1 market share in Canadian mutual fund AUM RBC® iShares strategic alliance maintained #1 market share in Canadian ETFs RBC GAM investment teams continued to integrate material ESG factors into their investment processes for applicable investment strategies	Continue to expand our investment capabilities to meet evolving client needs in our target distribution regions Continue shift to a more unified asset management operating model to take better advantage of enterprise and GAM global scale, resources and infrastructure

Outlook

The ongoing uncertainty in the macroeconomic environment, including the expectation of further interest rate increases and a slowdown in economic growth, will continue to impact markets.

Despite this uncertainty, we believe our diversified businesses remain well-positioned to continue growing our leading position in Canada and increasing our market share in the HNW and UHNW client segments globally, leveraging the strength of our brand, reputation and solid financial position. Our strategy remains unchanged as we continue to focus on delivering an unmatched client experience through holistic goals-based advice, attracting and retaining top-performing advisors, and collaborating across the enterprise to bring the full breadth of our capabilities to our clients. We will continue to invest in our people and technology to improve client and advisor experiences, drive operational efficiencies, and further strengthen our risk, compliance and controls infrastructure to meet heightened regulatory requirements.

For further details on our general economic review and outlook, refer to the Economic, market and regulatory review and outlook section.

Table of Contents

Wealth Management — Table 21

(Millions of Canadian dollars, except number of, percentage amounts and as otherwise noted)	2022	2021
Net interest income	$ 3,634	$ 2,689
Non-interest income	11,215	10,607
Total revenue	14,849	13,296
PCL on performing assets	21	(33)
PCL on impaired assets	13	(14)
PCL	34	(47)
Non-interest expense	10,701	9,929
Income before income taxes	4,114	3,414
Net income	$ 3,144	$ 2,626
Revenue by business		
Canadian Wealth Management	$ 4,308	$ 3,908
U.S. Wealth Management (including City National)	7,448	6,320
U.S. Wealth Management (including City National) (US$ millions)	5,757	5,035
Global Asset Management	2,667	2,726
International Wealth Management	426	342
Key ratios		
ROE	16.5%	15.9%
NIM	2.57%	2.25%
Pre-tax margin (1)	27.7%	25.7%
Selected balance sheet information		
Average total assets	$ 158,100	$ 136,000
Average total earning assets, net	141,200	119,500
Average loans and acceptances, net	99,800	84,000
Average deposits	158,800	143,000
Other information		
AUA (2), (3)	$ 1,387,900	$1,322,300
AUM (2)	991,500	1,000,600
Average AUA	1,318,100	1,242,400
Average AUM	966,300	937,200
PCL on impaired loans as a % of average net loans and acceptances	0.01%	(0.02)%
Number of employees (FTE)	22,782	19,486
Number of advisors (4)	6,158	5,548

Estimated impact of U.S. dollar, British pound and Euro translation on key income statement items

(Millions of Canadian dollars, except percentage amounts)	2022 vs. 2021
Increase (decrease):	
Total revenue	$ 158
PCL	5
Non-interest expense	129
Net income	17
Percentage change in average U.S. dollar equivalent of C$1.00	(3)%
Percentage change in average British pound equivalent of C$1.00	7%
Percentage change in average Euro equivalent of C$1.00	9%

(1) Pre-tax margin is defined as Income before income taxes divided by Total revenue.
(2) Represents year-end spot balances.
(3) In addition to Canadian Wealth Management, U.S. Wealth Management (including City National), and International Wealth Management, AUA includes $6,400 million (2021 – $7,100 million) related to GAM.
(4) Represents client-facing advisors across all our Wealth Management businesses.

Client assets – AUA — Table 22

(Millions of Canadian dollars)	2022	2021
AUA, beginning balance	$ 1,322,300	$ 1,100,000
Asset inflows	380,600	352,800
Asset outflows	(325,100)	(299,200)
Total net flows	55,500	53,600
Market impact	(153,000)	235,900
Acquisitions/dispositions	79,800	(12,100)
Foreign exchange	83,300	(55,100)
Total market, acquisition/dispositions and foreign exchange impact	10,100	168,700
AUA, balance at end of year	$ 1,387,900	$ 1,322,300

Client assets – AUM — Table 23

(Millions of Canadian dollars)	2022 Money market	Fixed income	Equity	Multi-asset and other	Total	2021 Total
AUM, beginning balance	$ 43,400	$ 233,300	$ 137,200	$ 586,700	$ 1,000,600	$ 836,400
Institutional inflows	100,000	42,900	16,100	16,600	175,600	97,900
Institutional outflows	(107,300)	(48,900)	(10,600)	(13,200)	(180,000)	(73,600)
Personal flows, net	(700)	(2,900)	1,900	22,700	21,000	51,000
Total net flows	(8,000)	(8,900)	7,400	26,100	16,600	75,300
Market impact	200	(27,200)	(18,100)	(71,600)	(116,700)	123,200
Acquisition/dispositions	–	–	–	58,500	58,500	(4,500)
Foreign exchange	2,200	(1,600)	2,900	29,000	32,500	(29,800)
Total market, acquisition/dispositions and foreign exchange impact	2,400	(28,800)	(15,200)	15,900	(25,700)	88,900
AUM, balance at end of year	$ 37,800	$ 195,600	$ 129,400	$ 628,700	$ 991,500	$ 1,000,600

AUA by geographic mix and asset class — Table 24

(Millions of Canadian dollars)	2022	2021
Canada (1)		
Money market	$ 26,200	$ 24,700
Fixed income	30,500	29,200
Equity	81,800	91,300
Multi-asset and other	369,500	377,400
Total Canada	508,000	522,600
U.S. (1)		
Money market	40,700	49,500
Fixed income	116,000	90,300
Equity	246,300	256,000
Multi-asset and other	297,100	308,400
Total U.S.	700,100	704,200
Other International (1)		
Money market	16,600	15,300
Fixed income	8,900	8,100
Equity	47,000	37,700
Multi-asset and other	107,300	34,400
Total International	179,800	95,500
Total AUA	$ 1,387,900	$ 1,322,300

(1) Geographic information is based on the location from where our clients are served.

Financial performance

2022 vs. 2021

Net income increased $518 million or 20% from last year, mainly due to higher net interest income reflecting higher average volume growth and interest rates as well as higher average fee-based client assets. The impact of a legal provision taken in U.S. Wealth Management (including City National) in the prior year that was partially released in the first quarter of 2022 also contributed to the increase. These factors were partially offset by higher staff-related costs and variable compensation.

Total revenue increased $1,553 million or 12%, largely due to higher net interest income driven by average volume growth of 19% in loans and 11% in deposits and higher interest rates. Higher average fee-based client assets, primarily reflecting net sales, and the impact of foreign exchange translation also contributed to the increase.

PCL was $34 million compared to $(47) million last year, primarily in U.S. Wealth Management (including City National), mainly attributable to releases of provisions on performing loans in the prior year reflecting the recovery from the COVID-19 pandemic, as compared to provisions taken in the current year, largely driven by unfavourable changes in our macroeconomic outlook. Provisions taken on impaired loans in the current year, as compared to recoveries in the prior year, also contributed to the increase, resulting in a 3 bps increase in the PCL on impaired loans ratio.

Non-interest expense increased $772 million or 8%, mainly due to higher staff and technology related costs. Higher variable compensation commensurate with increased results, the impact of foreign exchange translation as well as the Brewin Dolphin acquisition and related costs also contributed to the increase. Partly offsetting these factors was the impact of a legal provision taken in U.S. Wealth Management (including City National) in the prior year that was partially released in the first quarter of 2022.

AUA increased $66 billion or 5%, mainly due to the impact of foreign exchange translation, the inclusion of our acquisition of Brewin Dolphin, and net sales. These factors were partially offset by unfavourable market conditions.

AUM decreased $9 billion or 1%, primarily due to unfavourable market conditions, partially offset by the inclusion of our acquisition of Brewin Dolphin, the impact of foreign exchange translation and net sales.

Business line review

Canadian Wealth Management

Canadian Wealth Management includes our full-service Canadian wealth advisory business, which is the largest in Canada as measured by AUA, with over 1,950 investment advisors providing comprehensive financial solutions with a focus on HNW and UHNW clients. Additionally, we provide discretionary investment management and estate and trust services to our clients through over 100 investment counsellors and over 100 trust professionals across Canada.

We compete with domestic banks and trust companies, investment counselling firms, bank-owned full-service brokerages and boutique brokerages, mutual fund companies, and global private banks. In Canada, bank-owned wealth managers continue to be the major players.

Financial performance

Revenue increased $400 million or 10% from last year, primarily due to higher average fee-based client assets, largely driven by net sales, as well as higher net interest income from higher interest rates.

Selected highlights — Table 25

(Millions of Canadian dollars)	2022	2021
Total revenue	**$ 4,308**	$ 3,908
Other information		
Average loans and acceptances, net	**5,600**	4,600
Average deposits	**28,600**	26,200
AUA [1]	**511,300**	524,200
AUM [1]	**171,700**	168,900
Average AUA	**519,600**	486,100
Average AUM	**171,800**	151,900

(1) Represents year-end spot balances.

Average AUA and AUM (Millions of Canadian dollars)



U.S. Wealth Management (including City National)

U.S. Wealth Management (including City National) also encompasses PCG and our C&C businesses. PCG is the 7th largest full-service wealth advisory firm in the U.S., as measured by number of advisors, with over 2,100 financial advisors. Our C&C business delivers clearing and execution services for small to mid-sized independent broker-dealers and registered investment advisor firms. City National provides comprehensive financial solutions to affluent individuals, entrepreneurs, professionals, their businesses, and their families, and provides a premier banking and financial experience through a high-touch service model, proactive advice and financial solutions. City National offers a broad range of lending, deposit, cash management, equipment financing, wealth management, and other products and services. In the U.S., we operate in a fragmented and highly competitive industry. Our competitors include other broker-dealers, commercial banks and other financial institutions that service HNW and UHNW individuals, entrepreneurs and their businesses.

Financial performance

Revenue increased $1,128 million or 18% from last year. In U.S. dollars, revenue increased $722 million or 14%, primarily due to higher net interest income driven by average volume growth of 14% in loans and 9% in deposits as well as higher interest rates, which also drove higher revenue from sweep deposits. Higher average fee-based client assets, largely driven by net sales, also contributed to the increase.

NIM was up 21 bps, reflecting the impact of the rising interest rate environment as well as changes in average earning assets mix.

Selected highlights — Table 26

(Millions of Canadian dollars, except as otherwise noted)	2022	2021
Total revenue	**$ 7,448**	$ 6,320
Other information		
(Millions of U.S. dollars)		
Total revenue	**5,757**	5,035
NIM	**2.38%**	2.17%
Average earning assets, net	**98,100**	86,300
Average loans, guarantees and letters of credit, net	**68,800**	60,200
Average deposits	**90,600**	83,000
AUA [1]	**513,700**	568,800
AUM [1]	**159,200**	182,100
Average AUA	**538,100**	525,300
Average AUM	**168,100**	165,600

(1) Represents year-end spot balances.

Average AUA and AUM (Millions of U.S. dollars)



Global Asset Management

GAM provides global investment management services and solutions for individual and institutional investors in Canada, the U.K., the U.S., Europe, and Asia. We provide a broad range of investment management services through mutual, pooled and private funds, fee-based accounts, and separately managed portfolios. We distribute our investment solutions through a broad network of bank branches, our self-directed and full-service wealth advisory businesses, independent third-party advisors and private banks, and directly to individual clients. We also provide investment solutions directly to institutional clients, including pension plans, insurance companies, corporations, and endowments and foundations.

We are the largest retail fund company in Canada measured by AUM, as well as a leading institutional asset manager. We face competition in Canada from banks, insurance companies and asset management organizations. The Canadian fund management industry is large and mature, but remains a relatively fragmented industry.

In the U.S., our asset management business offers investment management solutions and services, primarily to institutional investors, and competes with independent asset management firms, as well as those that are part of national and international banks and insurance companies.

Internationally, through our global capabilities distributed under the brand RBC BlueBay Asset Management, we offer investment management solutions for institutions and, through private banks including RBC Wealth Management®, to HNW and UHNW investors. We face competition from asset managers that are owned by international banks, as well as national and regional asset managers in the geographies where we serve clients.

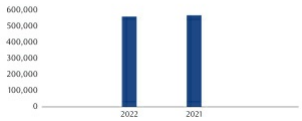
Financial performance
Revenue decreased $59 million or 2% from last year, largely due to changes in the fair value of seed capital investments, the impact of foreign exchange translation as well as lower performance fees. These factors were partially offset by higher fee-based revenue driven by the impact of net sales.

Selected highlights — Table 27

(Millions of Canadian dollars)	2022	2021
Total revenue	**$ 2,667**	$ 2,726
Other information		
Canadian net long-term mutual fund sales (redemptions) (1)	**(5,246)**	21,830
Canadian net money market mutual fund sales (redemptions) (1)	**(127)**	(2,757)
AUM (2)	**522,700**	597,300
Average AUM	**562,200**	568,200

(1) As reported to the Investment Funds Institute of Canada. Includes all prospectus-based mutual funds across our Canadian GAM businesses.
(2) Represents year-end spot balances.

Average AUM (Millions of Canadian dollars)



International Wealth Management

International Wealth Management includes operations in the U.K., Ireland, the Channel Islands and Asia. We provide customized and integrated wealth management solutions to HNW, UHNW and corporate clients in key financial centres. Competitors to our International Wealth Management business include global wealth managers, traditional private banks and domestic wealth managers.

Financial performance
Revenue increased $84 million or 25% from last year, primarily due to higher net interest income reflecting higher interest rates.

Selected highlights — Table 28

(Millions of Canadian dollars)	2022	2021
Total revenue	**$ 426**	$ 342
Other information		
Average loans, guarantees and letters of credit, net	**5,000**	4,600
Average deposits	**12,300**	12,500
AUA (1), (2)	**170,100**	86,800
AUM (1), (2)	**80,100**	8,900
Average AUA	**97,200**	90,500
Average AUM	**15,400**	9,300

(1) Represents year-end spot balances.
(2) AUA and AUM reflect the inclusion of $79,800 million and $72,400 million, respectively, related to our acquisition of Brewin Dolphin, which closed on September 27, 2022.

Average AUA and AUM (Millions of Canadian dollars)



Insurance

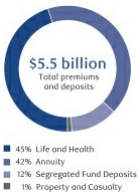
RBC Insurance® offers a wide range of advice and solutions for individual and business clients, including life, health, wealth, home, auto, travel, annuities, and reinsurance.

$3.5 billion
Total revenue

> 4.9 million
Number of clients

2,731
Employees

Premiums and Deposits



- 45% Life and Health
- 42% Annuity
- 12% Segregated Fund Deposits
- 1% Property and Casualty

RBC Insurance® is the largest Canadian bank-owned insurance organization on a total revenue basis and operates under two business lines: Canadian Insurance and International Insurance.

In Canada, we offer life, health, travel, wealth accumulation solutions, and annuities to individuals and businesses. We also offer home and auto insurance for individuals through a distribution agreement with Aviva Canada. Our products and services are distributed through a wide variety of channels, including advice centres, RBC Insurance® stores, mobile advisors, digital platforms, independent brokers and partners.

Outside Canada, we operate globally in the reinsurance and retrocession markets offering life, disability and longevity reinsurance.

2022 Operating environment

- In Canada, the COVID-19 pandemic continued to stimulate an increased interest in protection, positioning us well to deliver our market-leading products through our best-in-class network of advisors and partners. The industry continued to face a number of challenges and opportunities, including a rising interest rate environment, evolving regulatory requirements, a competitive landscape underscored by consolidation, continued digital disruption and changing client expectations. As a result, we evolved our robust risk frameworks, controls and risk culture to protect clients and meet the expectations of both federal and provincial regulators. We also accelerated investment in product innovation, digitization, and data to better meet client protection needs, enhance access and convenience, and deliver improved experiences. We prioritized investment in our people, positioning ourselves as an employer of choice.
- In the U.K., there was a sustained appetite for longevity risk transfer as companies continued to actively manage longevity risk. As a result, the longevity reinsurance market remained competitive in fiscal 2022.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2022	PRIORITIES IN 2023
Grow our Insurance business in Canada, and internationally	Launched RBC Growth Insurance Plus™ product for affluent Canadians looking to supplement life insurance needs, or for corporations, to help meet their corporate life insurance needs Introduced a new critical illness insurance product as an option for Group Benefits Solutions clients, strengthening our offering in the marketplace Launched a Workplace Wellness Toolkit designed to support businesses in assessing the wellbeing needs of their employees and creating wellness strategies tailored to the unique goals of their organization Continued to grow our longevity reinsurance and group annuity businesses, driven by our relationships within the U.K. and Canadian markets, and our strong underwriting expertise	Be an innovative, client-focused provider of a full suite of insurance solutions
Develop and sustain excellence in distribution	Launched RBC Insurance® Sales Technology Support Centre (STSC) to support advisors and their clients, resulting in faster and more efficient support for key tools and technologies Launched Aviva Underwriting Chat, giving our home and auto advisors the ability to chat directly with Aviva's Underwriters, improving the client experience by bringing efficiency, and reducing the time spent on hold while applications are considered Built the first interface between RBC Insurance® and our external distribution partners, allowing for more efficient new distribution channels and partnerships for term life products	Sustain distribution excellence through channel growth and by supporting our agents and partners with best-in-class tools, and unique value propositions
Accelerate investments in product innovation, digitization, and data	Launched electronic delivery of select life and health contracts, improving cycle times, and increasing contract delivery for clients Introduced a new disability electronic application enabling online submissions of certain disability products, simplifying the process, facilitating quicker decisions on applications, and reducing time to purchase Added digital signature capabilities to electronic applications for our simplified term life insurance product, improving the advisor and client experience	Invest in product innovation, risk selection, underwriting, digital capabilities and other solutions which streamline our processes in order to attract and retain clients
Evolve our risk culture	Added two socially responsible investing options to our segregated fund offerings. The fund investments exclude companies whose primary business is alcohol, tobacco products, firearms, cannabis, adult entertainment or gambling As part of our continuous commitment to diversity & inclusion, we enhanced the language of our Group Life and Health booklets and contracts, recognizing all gender identities	Evolve our robust risk frameworks, controls and risk culture to protect clients and meet the expectations of both federal and provincial regulators
Attract and retain top talent	Remained an employer of choice enabling us to attract, retain and engage employees to serve our clients and deliver value to our shareholders	Foster diversity, equity and inclusion, and focus on inspiring future readiness to attract, retain and engage top talent

Outlook

The insurance industry is expected to continue experiencing change in fiscal 2023 driven by evolving client expectations, accelerated digital disruption, and distribution innovation. Government and regulatory pressures are expected to continue into the coming fiscal year. As consumers focus more attention on overall protection, we will continue to provide advice and education, deliver our products and services, and create industry partnerships to assist our clients. We will maintain our strength by investing in technology, product and service innovation, efficient distribution channels, and a strong risk culture. This will enable our goal of being an innovative, client-focused provider of a full suite of insurance solutions, and will allow us to thrive in a rapidly changing environment.

For further details on our general economic review and outlook, refer to the Economic, market and regulatory review and outlook section.

Insurance — Table 29

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2022	2021
Non-interest income		
Net earned premiums	$ 4,653	$ 4,840
Investment Income, gains/(losses) on assets supporting insurance policyholder liabilities (1)	(1,363)	577
Fee income	220	183
Total revenue	3,510	5,600
PCL	–	(1)
Insurance policyholder benefits and claims (1)	1,468	3,547
Insurance policyholder acquisition expense	315	344
Non-interest expense	588	596
Income before income taxes	1,139	1,114
Net income	$ 857	$ 889
Revenue by business		
Canadian Insurance	$ 653	$ 2,917
International Insurance	2,857	2,683
Key ratios		
ROE	36.4%	37.4%
Selected balance sheet information		
Average total assets	$ 22,500	$ 21,600
Other information		
Premiums and deposits (2)	$ 5,498	$ 5,721
Canadian Insurance	2,999	3,162
International Insurance	2,499	2,559
Insurance claims and policy benefit liabilities	11,511	12,816
Fair value changes on investments backing policyholder liabilities (1)	(1,888)	(13)
Number of employees (FTE)	2,731	2,573

(1) Includes unrealized gains and losses on investments backing policyholder liabilities attributable to fluctuation of assets designated as FVTPL. The investments which support actuarial liabilities are predominantly fixed income assets designated as FVTPL. Consequently, changes in the fair values of these assets are recorded in Insurance premiums, investment and fee income in the Consolidated Statements of Income and are largely offset by changes in the fair value of the actuarial liabilities, the impact of which is reflected in PBCAE.
(2) Premiums and deposits include premiums on risk-based individual and group insurance and annuity products as well as segregated fund deposits, consistent with insurance industry practices.

Financial performance
2022 vs. 2021
Net income decreased $32 million or 4% from last year, largely due to the impact of lower new longevity reinsurance contracts, partially offset by higher favourable investment-related experience.

Total revenue decreased $2,090 million or 37%, mainly due to the change in fair value of investments backing policyholder liabilities and lower group annuity sales, both of which are largely offset in PBCAE as indicated below. These factors were partially offset by business growth in Canadian Insurance across the majority of our products.

PBCAE decreased $2,108 million or 54%, mainly reflecting the change in fair value of investments backing policyholder liabilities and lower group annuity sales, both of which are largely offset in revenue. Higher favourable investment-related experience and favourable annual actuarial assumption updates in the current year largely related to economic assumptions also contributed to the decrease. These factors were partially offset by the impact of lower new longevity reinsurance contracts, as well as business growth in Canadian Insurance.

Non-interest expense decreased $8 million or 1% mainly due to lower costs associated with ongoing efficiency initiatives and lower legal costs. These factors were partially offset by increased costs in support of sales and client service activities.

Business line review

Canadian Insurance

We offer life, health, travel, wealth accumulation solutions, and annuities to individuals and businesses across Canada. We also offer home and auto insurance for individuals, through a distribution agreement with Aviva Canada. Our life and health portfolio includes participating whole life, universal life, term life, critical illness, disability, and group benefits, including long-term disability, and health and dental insurance. Wealth solutions include a family of segregated funds as well as individual annuities. Our travel products include out-of-province/country medical coverage, and trip cancellation and interruption insurance.

Our group annuities business helps defined benefit pension plan sponsors better manage and control risk. RBC Insurance® has a set of strategies and initiatives aimed at building our momentum and positioning us for growth in this product line, where companies are increasingly looking to transfer the risks associated with their pension obligations to insurance companies – either through group annuity contracts or longevity swap products.

In Canada, many of our competitors specialize in either life or health or in property and casualty products. As a multi-line carrier, we offer a broad suite of solutions, increasing convenience for our clients. Many of our solutions hold market leadership positions, including our disability insurance and wealth products.

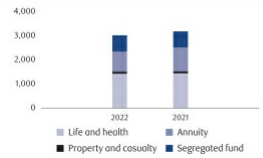
Financial performance
Total revenue decreased $2,264 million or 78% from last year, primarily due to the change in fair value of investments backing policyholder liabilities and lower group annuity sales. These factors were partially offset by business growth across the majority of our products.

Premiums and deposits decreased $163 million or 5%, mainly due to group annuity and individual life products.

Selected highlights — Table 30

(Millions of Canadian dollars)	2022	2021
Total revenue	**$ 653**	$ 2,917
Other information		
Premiums and deposits		
Life and health	**1,416**	1,434
Property and casualty	**81**	77
Annuity	**834**	989
Segregated fund deposits	**668**	662
Fair value changes on investments backing policyholder liabilities	**(2,259)**	(119)

Premiums and deposits (Millions of Canadian dollars)



International Insurance

International Insurance is primarily comprised of our reinsurance businesses which insure risks of other insurance and reinsurance companies. We offer life, disability and longevity reinsurance solutions.

The global reinsurance market is competitive with significant market opportunities in the U.S., U.K, and Europe. Market share is largely held by a small number of reinsurers, with RBC Insurance® continuing to have steady growth.

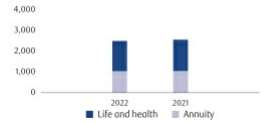
Financial performance
Total revenue increased $174 million or 6% from last year, mainly due to the change in fair value of investments backing policyholder liabilities.

Premiums and deposits decreased $60 million or 2%.

Selected highlights — Table 31

(Millions of Canadian dollars)	2022	2021
Total revenue	**$2,857**	$ 2,683
Other information		
Premiums and deposits		
Life and health	**1,044**	1,050
Annuity	**1,455**	1,509
Fair value changes on investments backing policyholder liabilities	**371**	106

Premiums and deposits (Millions of Canadian dollars)



Investor & Treasury Services

Investor & Treasury Services provides asset, payment and treasury services to financial institutions and asset owners worldwide. We are a leader in Canadian cash management and transaction banking services. Trusted with nearly 4 trillion in AUA, our focus is on safeguarding client assets and supporting our clients' growth.

$3.9 trillion
AUA

16.4%
Return on equity

$61.8 billion
Average client deposits

Revenue by Geography



Our product and service offering includes custody, fund administration, shareholder services, private capital services, middle office, transaction banking (including trade finance, insourced solutions and services to broker dealers), and treasury and market services (including cash/liquidity management, foreign exchange and securities finance).

Our asset services business competes against the world's largest custodians in selected countries in North America, Europe, and the U.K.

Our transaction banking business competes against the largest banks in Canada.

2022 Operating environment

- Results for our asset services business were impacted by industry headwinds such as continued pricing pressure, partially offset by rising interest rates.
- Our funding and liquidity business managed through a rising rate environment and results were driven by increased market opportunities.
- We continued to execute on initiatives to improve our cost structure, focus on markets and segments where we have competitive advantages and upgrade our technology capabilities.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2022	PRIORITIES IN 2023
Grow the Canadian franchise	Delivered significant revenue growth in our transaction banking business through acquisition of new clients, expansion of existing relationships, and delivery of new product offerings	Grow relationships with Canadian asset managers, investment counsellors, pension funds, insurance companies, and transaction banking clients Deliver new products to meet growing client demand and enhance our core capabilities in Canada to improve the client experience
Compete in select asset servicing segments and markets	Signed a Memorandum of Understanding to divest our European asset servicing activities and associated Malaysian centre of excellence Continued cross-segment collaboration to grow fund finance sales	Complete the intended divestiture (subject to customary closing conditions, including regulatory and antitrust approvals)
Deliver seamless client experiences and employ technology to enable our clients' success	Continued to evolve our digital offering, improve interactive applications to increase clients' digital self-service capacity and reduce operational risk	Continue to invest to seamlessly onboard, integrate and support our clients through digital channels

Outlook

In fiscal 2023, we expect the global asset services industry will remain challenging. While we expect some benefit from rising interest rates in fiscal 2023, ongoing fee reductions, competition from global custody providers in key markets and the impact of reduced client activity as a result of lower asset values and net client movements, are expected to constrain revenue growth. Ongoing inflationary pressures coupled with recession concerns also have the potential to impact our results in fiscal 2023. Completing the divestiture of our European asset servicing activities and associated Malaysian centre of excellence will be a priority. We will focus on growing in markets and segments where we have competitive advantages, improving operational efficiency and leveraging our investment in technology to enable our clients' success.

We will continue to prioritize prudent risk and funding management amidst an evolving liquidity environment and uncertain market backdrop.

For further details on our general economic review and outlook, refer to the Economic, market and regulatory review and outlook section.

Investor & Treasury Services — Table 32

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2022	2021
Net interest income	$ 498	$ 460
Non-interest income	1,725	1,704
Total revenue	2,223	2,164
PCL on performing assets	1	(8)
PCL on impaired assets	(4)	–
PCL	(3)	(8)
Non-interest expense	1,569	1,589
Income before income taxes	657	583
Net income	$ 513	$ 440
Key ratios		
ROE	16.4%	14.0%
Selected balance sheet information		
Average total assets	$ 250,600	$ 235,400
Average deposits	245,000	219,800
Average client deposits	61,800	64,400
Average wholesale funding deposits	183,200	155,400
Other information		
AUA (1)	$ 3,906,900	$ 4,640,900
Average AUA	4,392,600	4,634,900
Number of employees (FTE)	3,497	3,718

Estimated impact of U.S. dollar, British pound and Euro translation on key income statement items

(Millions of Canadian dollars, except percentage amounts)	2022 vs. 2021
Increase (decrease):	
Total revenue	$ (70)
PCL	–
Non-interest expense	(68)
Net income	(3)
Percentage change in average U.S. dollar equivalent of C$1.00	(3)%
Percentage change in average British pound equivalent of C$1.00	7%
Percentage change in average Euro equivalent of C$1.00	9%

(1) Represents year-end spot balances.

Financial performance

2022 vs. 2021

Net income increased $73 million or 17% from last year, mainly driven by higher revenue from client deposits, partially offset by higher technology-related costs.

Total revenue increased $59 million or 3%, mainly due to higher revenue from client deposits reflecting improved margins, partially offset by the impact of foreign exchange translation.

Non-interest expense decreased $20 million or 1%, mainly due to the impact of foreign exchange translation and lower staff-related costs. These factors were partially offset by higher technology-related costs, a favourable sales tax adjustment in the prior year and higher legal costs.

Capital Markets

RBC Capital Markets® is a premier global investment bank providing expertise in advisory & origination, sales & trading, and lending & financing to corporations, institutional clients, asset managers, private equity firms and governments globally. Our professionals ensure that clients receive the advice, products, and services their businesses need from 63 offices in 18 countries. Our presence extends across North America, the U.K. & Europe, and Australia, Asia & other regions.

>19,500
Number of clients

#9
Global league table rankings[1]

6,887
Employees

Revenue by Geography



- 49% U.S.
- 29% Canada
- 16% U.K. & Europe
- 6% Australia, Asia & other regions

We operate two main business lines, Corporate & Investment Banking and Global Markets.

In North America, we offer a full suite of products and services which include equity and debt origination and distribution, advisory services, and sales & trading. In Canada, we are a market leader with a strategic presence in all lines of capital markets businesses. In the U.S., where our competitors include large global investment banks, we have a full industry sector coverage and investment banking product range, as well as capabilities in credit, secured lending, municipal finance, fixed income, currencies & commodities, and equities.

Outside North America, we have a targeted strategic presence in the U.K. & Europe, Australia, Asia & other markets aligned to our global expertise. In the U.K. & Europe, we offer a diversified set of capabilities in key industry sectors of focus. In Australia and Asia, we compete with global and regional investment banks in targeted areas aligned to our global expertise, including fixed income distribution and currencies trading, secured financing, as well as corporate and investment banking.

2022 Operating environment

- The fiscal 2022 operating environment was characterized by significant geopolitical and economic uncertainty alongside elevated inflation and rising interest rates, resulting in increased financial market volatility and asset revaluation. This created a challenging operating environment that led to a decline in activity across some of our global capital markets businesses, particularly in the second half of the fiscal year. Global investment banking fee pools were impacted by weakness in credit and equity markets beginning in the second fiscal quarter of 2022, resulting in an approximately 30% decline in global investment banking fee pools[1] this fiscal year compared to record levels in fiscal 2021.
- Trading activity remained elevated in some businesses, particularly in macro-focused businesses such as rates and foreign exchange. However, this was offset by a more challenging environment for credit trading as a result of widening spreads and slower new issuance activities. Despite the market disruption, our balance sheet strength enabled us to continue supporting our clients during the 2022 fiscal year.
- While the credit environment in fiscal 2022 reflected the recovery from the COVID-19 pandemic, it also reflected unfavourable changes in our economic outlook towards the latter half of the year, including the impact of slowing economic growth as well as rising inflation and interest rates. PCL on impaired loans remained below pre-pandemic levels.

[1] Source: Dealogic, based on global investment bank fees, Fiscal 2022

Strategic priorities

OUR STRATEGY	PROGRESS IN 2022	PRIORITIES IN 2023
Grow and deepen client relationships	Strengthened relationships with key clients, resulting in high quality mandates and notable wins in Corporate & Investment Banking and Global Markets, for example: • Financial Advisor to DigitalBridge and IFM Investors on US$11 billion landmark communications infrastructure take-private transaction • Financial Advisor and Lead Arranger to The Vertex Company and American Industrial Partners on its merger with Vectrus, creating a US$2.1 billion entity	Deliver holistic coverage to clients and drive multi-product client relationships to gain market share Expand client coverage in underpenetrated sectors and products
Lead with advice and extend capabilities	Expanded advisory and thought leadership capabilities inclusive of Sustainable Finance[1] and Private Capital Refreshed our Global Markets strategy to deliver holistic client service providing trusted solutions and execution, leveraging origination and financing, enabled by digital offerings Examples include: • Joint Bookrunner and Global Coordinator on Definity Financial's Initial Public Offering (IPO) and Private Placement Agent on its Cornerstone Private Placement raising proceeds of C$2.1 billion, making it the largest IPO in Canadian financial services since 1999 • Advised SS&C Technologies on the £1.2 billion acquisition of BluePrism, demonstrating our strength in delivering support in complex cross-border, sector and product transactions involving publicly traded targets	Grow all areas of origination, inclusive of structured solutions, through partnership across Corporate & Investment Banking and Global Markets Continue to drive cross-platform and geographic collaboration across businesses and asset classes Lead on Sustainable Finance [1], Energy Transition, and Private Capital solutions
Leverage digital and data to deliver innovative solutions	Launched Aiden® Arrival, the second algorithm on the AI-based electronic trading platform, aimed at enhancing flexibility and control over trade execution Scaled our digital research platform, Elements, into next generation applications utilizing alternative data	Scale digital capabilities including electronic execution, analytics and platform capabilities across Capital Markets Generate differentiated insights and thought leadership leveraging data and analytics
Prioritize and align for impact	Embedded productivity and efficiency measures within the businesses, and formalized a benefits tracking process Enhanced collaboration with Treasury & Market Services to increase funding capacity	Strategically deploy talent, technology and financial resources to areas of greatest opportunity Align business and functional strategies to build scale and maximize impact
Drive agility and ease of doing business	Leveraged the newly created cross-business and functional Investment Review Board to address the technology capital allocation process	Improve processes, leveraging an end-to-end approach to enhance client outcomes Accelerate execution and simplify procedures to improve employee experience
Engage, enable and empower our talent	Invested in senior talent through external hiring and promotions and repositioned our talent strategy to be better aligned with business outcomes Advanced our Diversity & Inclusion (D&I) strategy and improved representation of diverse talent	Invest in talent through scaled development programs, increased mobility, senior hiring and promotions Deliver on D&I strategy and build on our inclusive culture

Outlook

In fiscal 2023, the outlook remains uncertain and financial market volatility is expected to persist. Despite these market dynamics, a modest recovery of capital markets industry revenues is expected. We will continue to pursue market share growth in both our Corporate & Investment Banking and Global Markets businesses. In Investment Banking, we continue to focus on targeted sectors and investment in talent, with an emphasis on advisory products. In Global Markets, our focus remains on delivering robust results through continued resource optimization, acceleration of cross-selling activities, further deployment of electronic and digital capabilities, and building on our strong risk management practices. In Corporate Banking, following higher levels of balance sheet deployment in support of increased client financing demands in fiscal 2022, we will continue to pursue a moderate growth approach consistent with our focus on our balance sheet-enabled strategy to deepen relationships with lending clients in order to drive growth in our non-lending businesses. This strategy will continue to be underpinned by strong credit risk management practices, optimization of our financial resources and supporting our clients in the execution of their strategies.

For further details on our general economic review and outlook, refer to the Economic, market and regulatory review and outlook section.

[1] Sustainable finance refers to financial activities that take into account environmental, social and governance factors

Table of Contents

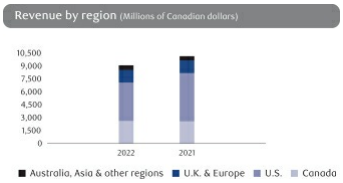
Capital Markets — Table 33

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2022	2021
Net interest income (1)	$ 4,698	$ 4,553
Non-interest income (1)	4,422	5,634
Total revenue (1)	9,120	10,187
PCL on performing assets	(34)	(476)
PCL on impaired assets	23	(33)
PCL	(11)	(509)
Non-interest expense	5,561	5,427
Income before income taxes	3,570	5,269
Net income	$ 2,921	$ 4,187
Revenue by business		
Corporate & Investment Banking	$ 4,309	$ 4,823
Global Markets	5,245	5,542
Other	(434)	(178)
Key ratios		
ROE	11.3%	18.3%
Selected balance sheet information		
Average total assets	$ 824,800	$ 710,200
Average trading securities	133,000	122,900
Average loans and acceptances, net	121,700	100,000
Average deposits	79,000	73,500
Other information		
Number of employees (FTE)	6,887	6,414
Credit information		
PCL on impaired loans as a % of average net loans and acceptances	0.01%	(0.04)%

Estimated impact of U.S. dollar, British pound and Euro translation on key income statement items

(Millions of Canadian dollars, except percentage amounts)	2022 vs. 2021
Increase (decrease):	
Total revenue	$ 42
PCL	–
Non-interest expense	8
Net income	34
Percentage change in average U.S. dollar equivalent of C$1.00	(3)%
Percentage change in average British pound equivalent of C$1.00	7%
Percentage change in average Euro equivalent of C$1.00	9%

(1) The teb adjustment for 2022 was $572 million (2021 – $518 million). For further discussion, refer to the How we measure and report our business segments section.



Financial performance

2022 vs. 2021

Net income decreased $1,266 million or 30% from last year, primarily driven by lower revenue in Corporate & Investment Banking, larger releases of provisions on performing assets in the prior year, and lower revenue in Global Markets.

Total revenue decreased $1,067 million or 10%, mainly due to the impact from loan underwriting markdowns, primarily in the U.S., largely driven by challenging market conditions. Lower debt and equity origination across most regions also contributed to the decrease. This was partially offset by higher lending revenue across most regions.

PCL was $(11) million compared to $(509) million last year, primarily attributable to releases of provisions on performing assets reflecting the recovery from the COVID-19 pandemic in both 2022 and 2021. The releases in the current year were partially offset by unfavourable changes in our macroeconomic outlook. Provisions taken on impaired loans in the current year as compared to recoveries in the prior year also contributed to the increase, resulting in an increase of 5 bps in the PCL on impaired loans ratio.

Non-interest expense increased $134 million or 2%, mainly due to higher technology-related costs, higher marketing and business development costs, and higher trade execution costs. These factors were partially offset by changes in the fair value of our share-based compensation plans, which was largely offset in other revenue.

Business line review

Corporate & Investment Banking

Corporate & Investment Banking comprises our corporate lending, municipal finance, loan syndication, debt and equity origination, and M&A advisory services. For debt and equity origination, revenue is allocated between Corporate & Investment Banking and Global Markets based on the contribution of each group in accordance with an established agreement.

Financial performance
Corporate & Investment Banking revenue of $4,309 million decreased $514 million or 11% from last year.

Investment Banking revenue decreased $773 million or 30%, mainly due to the impact from loan underwriting markdowns, primarily in the U.S., largely driven by challenging market conditions. Lower debt origination primarily in the U.S. also contributed to the decrease.

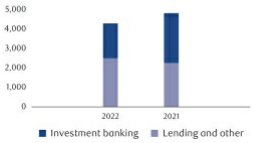
Lending and other revenue increased $259 million or 11%, primarily due to average volume growth in the U.S. and Europe.

Selected highlights — Table 34

(Millions of Canadian dollars)	2022	2021
Total revenue (1)	**$ 4,309**	$ 4,823
Breakdown of revenue (1)		
Investment banking	**1,786**	2,559
Lending and other (2)	**2,523**	2,264
Other information		
Average assets	**100,100**	81,400
Average loans and acceptances, net	**92,400**	73,300

(1) The teb adjustment for the year ended October 31, 2022 was $39 million (October 31, 2021 – $37 million). For further discussion, refer to the How we measure and report our business segments section.
(2) Comprises our corporate lending, client securitization, and global credit businesses.

Breakdown of total revenue (Millions of Canadian dollars)



Global Markets

Global Markets comprises our sales and trading businesses including fixed income, foreign exchange, commodities, and equities, as well as our repo and secured financing products.

Financial performance
Global Markets revenue of $5,245 million decreased $297 million or 5% from last year.

Revenue in our Fixed income, currencies and commodities business decreased $308 million or 11%, largely driven by lower fixed income trading revenue and lower debt origination both primarily in the U.S. These factors were partially offset by higher foreign exchange trading revenue across all regions.

Revenue in our Equities business decreased $73 million or 5%, primarily due to lower equity origination across most regions.

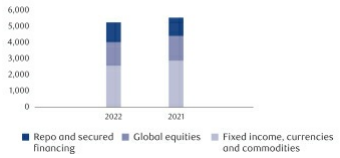
Revenue in our Repo and secured financing business increased $84 million or 7%, mainly due to increased client activity.

Selected highlights — Table 35

(Millions of Canadian dollars)	2022	2021
Total revenue (1)	**$ 5,245**	$ 5,542
Breakdown of revenue (1)		
Fixed income, currencies and commodities	**2,570**	2,878
Equities	**1,458**	1,531
Repo and secured financing (2)	**1,217**	1,133
Other information		
Average assets	**707,500**	626,500

(1) The teb adjustment for the year ended October 31, 2022 was $533 million (October 31, 2021 – $481 million). For further discussion, refer to the How we measure and report our business segments section.
(2) Comprises our secured funding businesses for internal businesses and external clients.

Breakdown of total revenue (Millions of Canadian dollars)



Other

Other includes our legacy portfolio, which mainly consists of our U.S. commercial mortgage-backed securities (MBS), bank-owned life insurance (BOLI) derivative contracts and structured rates in Asia.

Financial performance
Revenue decreased $256 million from last year, reflecting higher residual funding costs and changes in the fair value of hedges related to our share-based compensation plans, which was largely offset in non-interest expense.

Corporate Support

Corporate Support consists of Technology & Operations, which provides the technological and operational foundation required to effectively deliver products and services to our clients, Functions, which includes our finance, human resources, risk management, internal audit and other functional groups, as well as our Corporate Treasury function. Reported results for Corporate Support mainly reflect certain activities related to monitoring and oversight of enterprise activities which are not allocated to business segments. For further details, refer to the How we measure and report our business segments section.

Corporate Support — Table 36

(Millions of Canadian dollars)	2022	2021
Net interest income (loss) (1)	**$(132)**	$(321)
Non-interest income (loss) (1), (2)	**(728)**	421
Total revenue (1), (2)	**(860)**	100
PCL	**1**	(1)
Non-interest expense (2)	**(247)**	405
Income (loss) before income taxes (1)	**(614)**	(304)
Income taxes (recoveries) (1)	**(616)**	(365)
Net income (loss)	**$ 2**	$ 61

(1) Teb adjusted.

(2) Revenue for the year ended October 31, 2022, included losses of $363 million (October 31, 2021 – gains of $394 million) on economic hedges of our U.S. Wealth Management (including City National) share-based compensation plans, and non-interest expense included $(289) million (October 31, 2021 – $382 million) of share-based compensation expense driven by changes in the fair value of liabilities relating to our U.S. Wealth Management (including City National) share-based compensation plans.

Due to the nature of activities and consolidation adjustments reported in this segment, we believe that a comparative period analysis is not relevant.

Total revenue and Income taxes (recoveries) in each period in Corporate Support include the deduction of the teb adjustments related to the gross-up of income from Canadian taxable corporate dividends and the U.S. tax credit investment business recorded in Capital Markets. The amount deducted from revenue was offset by an equivalent increase in Income taxes (recoveries).

The teb amount for the year ended October 31, 2022 was $572 million and was $518 million last year.

The following identifies the material items, other than the teb impacts noted previously, affecting the reported results in each year.

2022
Net income was $2 million. Net favourable tax adjustments and asset/liability management activities were offset by residual unallocated items.

2021
Net income was $61 million, primarily due to asset/liability management activities and residual unallocated items, partially offset by net unfavourable tax adjustments.

Quarterly financial information

Fourth quarter performance

Q4 2022 vs. Q4 2021
Fourth quarter net income of $3,882 million was down $10 million. Diluted EPS of $2.74 was up $0.06 and ROE of 15.6% was down 130 bps. Our CET1 ratio of 12.6% was down 110 bps from a year ago. Lower results in Capital Markets and Corporate Support were partially offset by strong earnings in Wealth Management and Personal & Commercial Banking.

Total revenue increased $191 million or 2%, largely due to higher net interest income and trading revenue. These factors were partially offset by lower insurance revenue, other revenue, underwriting and other advisory fees and mutual fund revenue.

Net interest income increased $1,221 million or 24%, mainly due to higher spreads and average volume growth in loans and deposits in Canadian Banking and Wealth Management. These factors were partially offset by lower net interest income in Investor & Treasury Services reflecting higher funding costs that were offset by related gains on non-trading derivatives in Other revenue.

Insurance revenue decreased $857 million or 57%, primarily due to lower group annuity sales and the change in fair value of investments backing policyholder liabilities, both of which are largely offset in PBCAE.

Trading revenue increased $348 million, largely due to higher fixed income trading revenue across most regions.

Mutual fund revenue decreased $132 million or 12%, largely due to lower average mutual fund balances in Wealth Management and Canadian Banking.

Underwriting and other advisory fees decreased $174 million or 27%, mainly due to lower debt origination across all regions.

Other revenue decreased $219 million or 90%, largely due to the impact of economic hedges, including changes in the fair value of hedges related to our U.S. share-based compensation plans that were largely offset in Non-interest expense. These factors were partially offset by net gains on non-trading derivatives, which were offset within net interest income.

Total PCL was $381 million compared to $(227) million last year, reflecting provisions taken on performing loans and higher provisions on impaired loans in the current quarter as compared to releases of provisions on performing loans in the prior year, primarily in Personal & Commercial Banking. The PCL on loans ratio of 18 bps compared to (12) bps last year increased 30 bps.

PBCAE decreased $916 million, primarily due to lower group annuity sales and the change in fair value of investments backing policyholder liabilities, both of which are largely offset in revenue. Higher favourable annual actuarial assumption updates largely related to economic assumption updates in the current year also contributed to the decrease.

Non-interest expense increased $626 million or 10%, mainly attributable to higher variable compensation, primarily due to the timing of true-ups related to our variable compensation plans in Capital Markets and higher staff-related costs. The impact of foreign exchange translation as well as the Brewin Dolphin acquisition and related costs also contributed to the increase. These factors were partially offset by the change in the fair value of our U.S. share-based compensation plans as well as the impact of a legal provision taken in U.S Wealth Management (including City National) in the prior year that was partially released in the first quarter of 2022.

Income tax expense decreased $117 million or 11%, primarily due to an increase in income from lower tax rate jurisdictions in the current year and lower income before income taxes. The effective income tax rate of 20.1% decreased 190 bps from last year, mainly due to an increase in income from lower tax rate jurisdictions in the current year.

Q4 2022 vs. Q3 2022

Net income of $3,882 million was up $305 million or 9% compared to last quarter, primarily due to higher fixed income trading revenue in Capital Markets as the prior quarter included the impact from loan underwriting markdowns, primarily in the U.S, and higher spreads in Canadian Banking and Wealth Management. These factors were partially offset by higher compensation, primarily due to the timing of true-ups related to our variable compensation plans.

Quarterly results and trend analysis

Our quarterly results are impacted by a number of trends and recurring factors, which include seasonality of certain businesses, general economic and market conditions, and fluctuations in the Canadian dollar relative to other currencies. The following table summarizes our results for the last eight quarters (the period):

Quarterly results (1) — Table 37

(Millions of Canadian dollars, except per share and percentage amounts)	2022				2021			
	Q4	Q3	Q2	Q1	Q4	Q3	Q2	Q1
Personal & Commercial Banking	**$ 5,419**	$ 5,182	$ 4,739	$ 4,803	$ 4,605	$ 4,651	$ 4,527	$ 4,563
Wealth Management	**3,976**	3,655	3,605	3,613	3,444	3,373	3,260	3,219
Insurance	**644**	1,233	234	1,399	1,501	1,754	536	1,809
Investor & Treasury Services	**503**	582	551	587	548	517	534	565
Capital Markets (2)	**2,313**	1,649	2,348	2,810	2,298	2,463	2,718	2,708
Corporate Support (2)	**(288)**	(169)	(257)	(146)	(20)	(2)	43	79
Total revenue	**12,567**	12,132	11,220	13,066	12,376	12,756	11,618	12,943
PCL	**381**	340	(342)	105	(227)	(540)	(96)	110
PBCAE	**116**	850	(180)	997	1,032	1,304	149	1,406
Non-interest expense	**7,209**	6,386	6,434	6,580	6,583	6,420	6,379	6,542
Income before income taxes	**4,861**	4,556	5,308	5,384	4,988	5,572	5,186	4,885
Income taxes	**979**	979	1,055	1,289	1,096	1,276	1,171	1,038
Net income	**$ 3,882**	$ 3,577	$ 4,253	$ 4,095	$ 3,892	$ 4,296	$ 4,015	$ 3,847
EPS – basic	**$ 2.75**	$ 2.52	$ 2.97	$ 2.84	$ 2.68	$ 2.97	$ 2.76	$ 2.66
– diluted	**2.74**	2.51	2.96	2.84	2.68	2.97	2.76	2.66
Effective income tax rate	**20.1%**	21.5%	19.9%	23.9%	22.0%	22.9%	22.6%	21.2%
Period average US$ equivalent of C$1.00	**$ 0.739**	$ 0.783	$ 0.789	$ 0.787	$ 0.796	$ 0.812	$ 0.798	$ 0.779

(1) Fluctuations in the Canadian dollar relative to other foreign currencies have affected our consolidated results over the period.

(2) Teb adjusted. For further discussion, refer to the How we measure and report our business segments section of this 2022 Annual Report.

Seasonality

Seasonal factors may impact our results in certain quarters. The first quarter has historically been stronger for our Capital Markets businesses. The second quarter has fewer days than the other quarters, which generally results in a decrease in net interest income and certain expense items. The third and fourth quarters include the summer months which generally results in lower client activity and may negatively impact the results of our Capital Markets trading business.

Trend analysis

Earnings over the period have been impacted by the factors noted below.

Personal & Commercial Banking revenue has benefitted from solid volume growth in loans and deposits over the period. NIM has been favourably impacted by the rising interest rate environment over the last three quarters, whereas a low interest rate environment persisted in the earlier part of the period.

Wealth Management revenue has benefitted from growth in average fee-based client assets, which is impacted by market conditions, and volume growth in loans and deposits over the period. The rising interest rate environment also favourably impacted revenue over the last three quarters, whereas a low interest rate environment persisted in the earlier part of the period.

Insurance revenue has fluctuated over the period, primarily due to the impact of changes in the fair value of investments backing policyholder liabilities as well as the timing of group annuity sales, both of which are largely offset in PBCAE. Group annuity sales are generally higher in the first half of the fiscal year.

Investor & Treasury Services revenue has been impacted by interest rate movements, market volatility and client activity over the period.

Capital Markets revenue is influenced, to a large extent, by market conditions that impact client activity. Trading revenue across the first half of the period benefitted from increased client activity. Beginning in the second quarter of 2022, there was a decline in global fee pools. Trading results were further impacted notably in the third quarter of 2022 amidst challenging market conditions, driving lower fixed income trading revenue, including the impact from loan underwriting markdowns.

PCL is comprised of provisions taken on performing assets and provisions taken on impaired assets. PCL on performing assets has fluctuated over the period as it is impacted by changes in macroeconomic conditions, exposures and credit quality. Throughout 2021 and the first half of 2022, we saw improvements in our macroeconomic and credit quality outlook, as the economic impact from the COVID-19 pandemic eased in most regions, resulting in releases of provisions on performing assets. In the last half of 2022, unfavourable changes in our macroeconomic outlook resulted in an increase in provisions. PCL on impaired assets remained lower than pre-pandemic levels over the period.

PBCAE has fluctuated over the period reflecting changes in the fair value of investments backing policyholder liabilities, which is impacted by changes in market conditions, as well as group annuity sales, both of which are largely offset in revenue. PBCAE has also fluctuated due to the impact of investment-related experience and claims costs over the period. Actuarial adjustments, which generally occur in the fourth quarter of each year, also impact PBCAE.

Non-interest expense has been impacted by fluctuations in variable compensation over the period, commensurate with fluctuations in revenue and earnings. Changes in the fair value of our U.S. share-based compensation plans, which are largely offset in revenue, have also contributed to fluctuations over the period and are impacted by market conditions. While we continue to focus on efficiency management activities, expenses over the period also reflect investments in staff and technology and increases in discretionary spend, including marketing. The fourth quarter of 2021 included a legal provision in U.S. Wealth Management (including City National) that was partially released in the first quarter of 2022.

Our effective income tax rate has fluctuated over the period, mostly due to varying levels of tax adjustments and changes in earnings mix. The second and fourth quarters of 2022 reflected the impact of net favourable tax adjustments and an increase in income from lower tax rate jurisdictions, respectively.

Financial condition

Condensed balance sheets

Table 38

As at October 31 (Millions of Canadian dollars)	2022	2021
Assets		
Cash and due from banks	**$ 72,397**	$ 113,846
Interest-bearing deposits with banks	**108,011**	79,638
Securities, net of applicable allowance (1)	**318,223**	284,724
Assets purchased under reverse repurchase agreements and securities borrowed	**317,845**	307,903
Loans		
Retail	**549,751**	503,598
Wholesale	**273,967**	218,066
Allowance for loan losses	**(3,753)**	(4,089)
Other – Derivatives	**154,439**	95,541
– Other (2)	**126,339**	107,096
Total assets	**$ 1,917,219**	$ 1,706,323
Liabilities		
Deposits	**$ 1,208,814**	$ 1,100,831
Other – Derivatives	**153,491**	91,439
– Other (2)	**436,714**	405,698
Subordinated debentures	**10,025**	9,593
Total liabilities	**1,809,044**	1,607,561
Equity attributable to shareholders	**108,064**	98,667
Non-controlling interests	**111**	95
Total equity	**108,175**	98,762
Total liabilities and equity	**$ 1,917,219**	$ 1,706,323

(1) Securities are comprised of trading and investment securities.

(2) Other – Other assets and liabilities include Segregated fund net assets and liabilities, respectively.

2022 vs. 2021

Total assets increased $211 billion or 12% from last year. Foreign exchange translation increased total assets by $114 billion.

Cash and due from banks was down $41 billion or 36%, primarily due to lower deposits with central banks, reflecting our liquidity and short-term cash management activities.

Interest-bearing deposits with banks increased $28 billion or 36%, mainly due to higher deposits with central banks, reflecting our short-term cash and liquidity management activities.

Securities, net of applicable allowance, were up $33 billion or 12%, mainly due to higher government securities, reflecting short-term market opportunities and liquidity management activities, and the impact of foreign exchange translation. These factors were partially offset by lower equity trading securities.

Assets purchased under reverse repurchase agreements (reverse repos) and securities borrowed increased $10 billion or 3%, primarily due to the impact of foreign exchange translation and liquidity management activities, partially offset by decreased client demand.

Loans (net of Allowance for loan losses) were up $102 billion or 14%, primarily due to volume growth in wholesale loans and residential mortgages. The impact of foreign exchange translation also contributed to the increase.

Derivative assets were up $59 billion or 62%, primarily attributable to the impact of foreign exchange translation.

Other assets were up $19 billion or 18%, primarily reflecting higher cash collateral and margin deposits. The impact of foreign exchange translation also contributed to the increase.

Total liabilities increased $201 billion or 13% from last year. Foreign exchange translation increased total liabilities by $114 billion.

Deposits increased $108 billion or 10%, mainly due to issuances of long-term and short-term notes due to funding requirements and the impact of foreign exchange translation. Higher retail deposits also contributed to the increase.

Derivative liabilities were up $62 billion or 68%, primarily attributable to the impact of foreign exchange translation and higher fair values on interest rate contracts, partially offset by lower fair values on foreign exchange contracts.

Other liabilities increased $31 billion or 8%, primarily due to higher short-term borrowings of subsidiaries due to funding requirements, higher cash collateral and the impact of foreign exchange translation.

Total equity increased $9 billion or 10%, mainly reflecting earnings, net of dividends, and other comprehensive income (OCI). These factors were partially offset by share repurchases.

Off-balance sheet arrangements

In the normal course of business, we engage in a variety of financial transactions that, for accounting purposes, are not recorded on our Consolidated Balance Sheets. Off-balance sheet transactions are generally undertaken for risk, capital and funding management purposes which benefit us and our clients. These include transactions with structured entities and may also include the issuance of guarantees. These transactions give rise to, among other risks, varying degrees of market, credit, liquidity and funding risk, which are discussed in the Risk management section.

We use structured entities to securitize our financial assets as well as assist our clients in securitizing their financial assets. These entities are not operating entities, typically have no employees, and may or may not be recorded on our Consolidated Balance Sheets.

In the normal course of business, we engage in a variety of financial transactions that may qualify for derecognition. We apply the derecognition rules to determine whether we have transferred substantially all the risks and rewards or control associated with the financial assets to a third party. If the transaction meets specific criteria, it may qualify for full or partial derecognition from our Consolidated Balance Sheets.

Securitizations of our financial assets

We periodically securitize our credit card receivables and residential and commercial mortgage loans primarily to diversify our funding sources, enhance our liquidity position and for capital purposes. We also securitize residential and commercial mortgage loans as part of our sales and trading activities.

We securitize our credit card receivables, on a revolving basis, through a consolidated structured entity. We securitize single and multiple-family residential mortgages through the National Housing Act Mortgage-Backed Securities (NHA MBS) program. The majority of our securitization activities are recorded on our Consolidated Balance Sheets as we do not meet the derecognition criteria. During 2022 and 2021, we did not derecognize any mortgages securitized through the NHA MBS program. For further details, refer to Note 7 and Note 8 of our 2022 Annual Consolidated Financial Statements.

We also periodically securitize commercial mortgage loans by selling them in collateral pools, which meet certain diversification, leverage and debt coverage criteria, to structured entities, one of which is sponsored by us. Securitized commercial mortgage loans are derecognized from our Consolidated Balance Sheets as we have transferred substantially all of the risks and rewards of ownership of the securitized assets. During the year ended October 31, 2022, we securitized $450 million of commercial mortgages (October 31, 2021 – $nil). Our continuing involvement with the transferred assets is limited to servicing certain of the underlying commercial mortgages sold. As at October 31, 2022, there was $2 billion of commercial mortgages outstanding that we continue to service related to these securitization activities (October 31, 2021 – $2 billion).

Involvement with unconsolidated structured entities

In the normal course of business, we engage in a variety of financial transactions with structured entities to support our customers' financing and investing needs, including securitization of our clients' financial assets, creation of investment products, and other types of structured financing.

We have the ability to use credit mitigation tools such as third-party guarantees, credit default swaps, and collateral to mitigate risks assumed through securitization and re-securitization exposures. The process in place to monitor the credit quality of our securitization and re-securitization exposures involves, among other things, reviewing the performance data of the underlying assets. We affirm our ratings each quarter and formally confirm or assign a new rating at least annually. For further details on our activities to manage risks, refer to the Risk management section.

Below is a description of our activities with respect to certain significant unconsolidated structured entities. For a complete discussion of our interests in consolidated and unconsolidated structured entities, refer to Note 8 of our 2022 Annual Consolidated Financial Statements.

RBC-administered multi-seller conduits

We administer multi-seller conduits which are used primarily for the securitization of our clients' financial assets. Our clients primarily use our multi-seller conduits to diversify their financing sources and to reduce funding costs by leveraging the value of high-quality collateral. The conduits offer us a favourable revenue stream and risk-adjusted return.

We provide services such as transaction structuring, administration, backstop liquidity facilities and partial credit enhancements to the multi-seller conduits. Revenue for all such services amounted to $296 million during the year (October 31, 2021 – $304 million).

Our total commitment to the conduits in the form of backstop liquidity and credit enhancement facilities is shown below. The total committed amount of these facilities exceeds the total amount of the maximum assets that may have to be purchased by the conduits under the purchase agreements. As a result, the maximum exposure to loss attributable to our backstop liquidity and credit enhancement facilities is less than the total committed amounts of these facilities.

Liquidity and credit enhancement facilities — Table 39

As at October 31 (Millions of Canadian dollars)	2022 Notional of committed amounts (1)	2022 Allocable notional amounts	2022 Maximum exposure to loss (2)	2021 Notional of committed amounts (1)	2021 Allocable notional amounts	2021 Maximum exposure to loss (2)
Backstop liquidity facilities	$ 48,235	$ 45,261	$ 45,261	$ 40,876	$ 38,330	$ 38,330
Credit enhancement facilities (3)	2,974	2,974	2,974	2,546	2,546	2,546
Total	$ 51,209	$ 48,235	$ 48,235	$ 43,422	$ 40,876	$ 40,876

(1) Based on total committed financing limit.

(2) Not presented in the table above are derivative assets with a fair value of $25 million (October 31, 2021 – $17 million) which are a component of our total maximum exposure to loss from our interests in the multi-seller conduits. Refer to Note 8 of our 2022 Annual Consolidated Financial Statements for more details.

(3) Includes $14 million (October 31, 2021 – $9 million) of Financial standby letters of credit.

As at October 31, 2022, the notional amount of backstop liquidity facilities we provide increased $7 billion or 18% from last year, primarily due to an increase in outstanding securitized assets of the multi-seller conduits as well as the impact of foreign exchange translation. The notional amount of partial credit enhancement facilities we provide increased $428 million or 17% from last year, primarily due to an increase in outstanding securitized assets of the multi-seller conduits.

Maximum exposure to loss by client type — Table 40

As at October 31 (Millions of dollars)	2022 US$	2022 C$	2022 Total C$	2021 US$	2021 C$	2021 Total C$
Outstanding securitized assets						
Auto and truck loans and leases	$ 10,553	$ 3,967	$ 18,351	$ 11,546	$ 3,752	$ 18,048
Consumer loans	3,198	–	4,359	2,466	–	3,054
Credit cards	4,932	719	7,441	3,876	510	5,309
Dealer floor plan receivables	1,012	580	1,960	906	770	1,892
Equipment receivables	2,291	243	3,365	2,227	–	2,757
Fleet finance receivables	785	213	1,283	366	213	667
Insurance premiums	143	428	624	170	428	638
Residential mortgages	–	1,785	1,785	–	873	873
Student loans	2,013	139	2,882	1,587	–	1,965
Trade receivables	2,306	–	3,144	2,337	–	2,893
Transportation finance	2,119	153	3,041	2,163	102	2,780
Total	$ 29,352	$ 8,227	$ 48,235	$ 27,644	$ 6,648	$ 40,876
Canadian equivalent	$ 40,007	$ 8,227	$ 48,235	$ 34,228	$ 6,648	$ 40,876

Our overall exposure increased 18% compared to last year, primarily due to an increase in the outstanding securitized assets of the multi-seller conduits as well as the impact of foreign exchange translation. Correspondingly, total assets of the multi-seller conduits increased $7 billion or 18% from last year, also primarily due to an increase in outstanding securitized assets in the multi-seller conduits as well as the impact of foreign exchange. All of the multi-seller conduits transactions were internally rated A or above. All transactions funded by the unconsolidated multi-seller conduits are internally rated using a rating system as outlined in the internal ratings map in the credit risk section.

Multiple independent debt rating agencies review all of the transactions in the multi-seller conduits. Transactions financed in the U.S. multi-seller conduits are reviewed by Moody's Investors Service (Moody's), Standard & Poor's (S&P) and Fitch Ratings (Fitch). Transactions in two of the Canadian multi-seller conduits are reviewed by DBRS Morningstar (DBRS) and Moody's while one of the Canadian multi-seller conduits is also reviewed by S&P. Each applicable rating agency also reviews ongoing transaction performance on a monthly basis and may publish reports detailing portfolio and program information related to the conduits.

As at October 31, 2022, the total asset-backed commercial paper (ABCP) issued by the conduits amounted to $33 billion, an increase of $8 billion or 32% from last year, primarily due to higher client usage. The rating agencies that rate the ABCP rated 100% (October 31, 2021 – 100%) of the total amount issued within the top ratings category.

Structured finance

We provide liquidity facilities to certain municipal bond tender option bond trusts in which we have an interest but do not consolidate because the residual certificates issued by the tender option bond trusts are held by third parties. As at October 31, 2022, our maximum exposure to loss from these unconsolidated municipal bond tender option bond trusts was $3 billion (October 31, 2021 – $3 billion).

We provide senior warehouse financing to unaffiliated structured entities that are established by third parties to acquire loans and issue term collateralized loan obligations (CLO). Subordinated financing is provided during the warehouse phase by either the collateral manager or third-party investors. Subordinated financing serves as the first loss tranche which absorbs losses prior to ourselves as the senior lender. A portion of the proceeds from the sale of the term CLO is used to fully repay the senior warehouse financing that we provide. As at October 31, 2022, our maximum exposure to loss associated with the outstanding senior warehouse financing facilities was $640 million (October 31, 2021 – $951 million). The decrease in our maximum exposure to loss from last year was driven by repayments of existing financing facilities partially offset by the impact of foreign exchange translation.

We provide senior financing to unaffiliated structured entities that are established by third parties to acquire loans. Subordinated financing is provided by either the collateral manager or third-party investors. Subordinated financing serves as the first loss tranche which absorb losses prior to ourselves as the senior lender. These facilities tend to be longer in term than the CLO warehouse facilities and benefit from credit enhancement designed to cover a multiple of historical losses. As at October 31, 2022, our maximum exposure to loss associated with the outstanding senior financing facilities was $5 billion (October 31, 2021 – $4 billion). The increase in our maximum exposure to loss from last year was driven by the addition of new financing facilities as well as the impact of foreign exchange translation.

Investment funds
We invest in hedge funds primarily to provide clients with desired exposures to reference funds. As we make investments in the reference funds, exposures to the funds are simultaneously transferred to clients through derivative transactions. Our maximum exposure to loss in the reference funds is limited to our investments in the funds. As at October 31, 2022, our maximum exposure to loss was $3 billion (October 31, 2021 – $3 billion).

We also provide liquidity facilities to certain third-party investment funds. The funds issue unsecured variable-rate preferred shares and invest in portfolios of tax exempt bonds. As at October 31, 2022, our maximum exposure to loss on these funds was $667 million (October 31, 2021 – $606 million). The increase in our maximum exposure to loss from last year was driven by the addition of new financing facilities as well as the impact of foreign exchange translation.

Third-party securitization vehicles
We hold interests in certain unconsolidated third-party securitization vehicles, which are structured entities. We, as well as other financial institutions, are obligated to provide funding to these entities up to our maximum commitment level and are exposed to credit losses on the underlying assets after various credit enhancements. As at October 31, 2022, our maximum exposure to loss in these entities was $14 billion (October 31, 2021 – $12 billion). The increase in our maximum exposure to loss compared to last year reflects an increase in client activity with third-party securitization vehicles. Interest and non-interest income earned in respect of these investments was $186 million (October 31, 2021 – $89 million).

Guarantees, retail and commercial commitments
We provide our clients with guarantees and commitments that expose us to liquidity and funding risks. Our maximum potential amount of future payments in relation to our commitments and guarantee products as at October 31, 2022 amounted to $453 billion compared to $414 billion last year, primarily driven by the impact of foreign exchange translation and volume growth in other commitments to extend credit. Refer to Liquidity and funding risk and Note 24 of our 2022 Annual Consolidated Financial Statements for details regarding our guarantees and commitments.

Risk management

We are in the business of managing the risks inherent to the financial services industry as we aim to create maximum value for our shareholders, clients, employees and communities. The ability to manage risk is a core competency of the bank, and is supported by our risk-aware culture and risk management approach. Our view of risks is dynamic, and reflects the pace of change in the financial services industry.

Top and emerging risks

An important component of our risk management approach is to ensure that top and emerging risks, as they evolve, are identified, managed, and incorporated into our existing risk management assessment, measurement, monitoring and escalation processes and addressed in our risk frameworks and policies. These practices are intended to ensure a forward-looking risk assessment is maintained by management in the course of business development and as part of the execution of ongoing risk oversight responsibilities. Top and emerging risks are discussed by senior management and the Board on a regular basis.

We have developed supplementary internal guidance to support enterprise-wide identification and assessment of all material risks, including those that are not readily apparent. Top and emerging risks encompass those that could materially impact our financial results, financial and operational resilience, reputation, business model, or strategy, as well as those that may materially impact us as the risks evolve. The following represents our top and emerging risks:

Top & emerging risks	Description
Business and economic conditions	Our financial results are affected to varying degrees by the general business and economic conditions in the geographic regions in which we operate. These conditions may include factors such as: consumer saving and spending habits; consumer borrowing and repayment patterns; unemployment rates; the differing economic trajectories among nations across the globe, global tensions and geopolitical uncertainty; the level of business investment and overall business sentiment; trade; the direction of the COVID-19 pandemic and the emergence of new pathogens; the level of government spending as well as fiscal and monetary policy; the level of activity and volatility of the financial markets; disruptions to energy and other commodity markets; competitiveness; supply chain challenges and labour shortages affecting certain sectors; the evolution of elevated inflationary pressures; and possible stagflation or deflation. Moreover, interest rate changes and actions taken by central banks to manage inflation or the broader economy have implications for us. Our financial results are sensitive to changes in interest rates, as described in the Systemic risk section. For example, a slowdown in economic growth or an economic downturn could adversely impact employment rates and household incomes, consumer spending, housing prices, corporate earnings and business investment and could adversely affect our business, including but not limited to the demand for our loan and other products, and result in lower earnings, including higher credit losses. In addition to risks arising from monetary policy tightening, risks are also emerging around how governments will seek to recoup pandemic-related support, or any new support provided to deal with emerging economic challenges. This may include, for example, changes to tax policy to address fiscal capacity concerns and to balance budgets in the future. There are also emerging risks related to wealth and income inequality, as well as changing demographics and immigration, which could impact the labour market, inflation, demand and consumer trends, and potentially have broader societal and government policy implications.

Top & emerging risks	Description
Canadian housing and household indebtedness 	Notwithstanding currently low unemployment rates, Canadian housing and household indebtedness risks remain heightened in the current rising interest rate environment. Concerns related to elevated levels of mortgage-related Canadian household debt, which accelerated during the COVID-19 pandemic, could escalate if the BoC continues to increase interest rates, if the current period of elevated inflation is prolonged or if unemployment increases, potentially resulting in, among other things, higher credit losses. Moreover, continued interest rate increases or slowing economic growth could adversely impact housing market activity and housing prices, which could push loan-to-value (LTV) ratios higher and further increase credit losses. While real estate rental activity has rebounded in certain markets, changing consumer preferences and work arrangements, and the impact from elevated borrowing costs, may continue to have an adverse impact on future real estate investment and demand.
Information technology and cyber risks 	Information technology (IT) and cyber risks remain top risks, not only for the financial services sector, but for other industries worldwide. Geopolitical tensions have increased the risk of nation state actors attacking critical infrastructure, including banks and critical third-party suppliers (e.g., utilities, telecom providers, etc.). We continue to be subject to the heightened inherent risk of cyber-attacks, data breaches, cyber extortion and similar compromises, due to: (i) the size, scale, and global nature of our operations; (ii) our heavy reliance on the internet to conduct day-to-day business activities; (iii) our intricate technological infrastructure; and (iv) our reliance on third-party service providers. Ransomware threats are growing in sophistication and being used to launch major supply chain attacks. Additionally, clients' use of personal devices can create further avenues for potential cyber-related incidents, as the bank has little or no control over the safety of these devices. Resulting implications could include business interruptions, client service disruptions, financial loss, theft of intellectual property and confidential information, litigation, enhanced regulatory attention and penalties, as well as reputational damage. Furthermore, the adoption of emerging technologies, such as cloud computing, Artificial Intelligence (AI) and robotics, call for continued focus and investment to manage risks effectively. For more details on how we are managing these risks, refer to the Operational risk section.
Geopolitical uncertainty 	In 2022, the Russia-Ukraine conflict upended the geopolitical landscape, with wide-ranging impacts to the global economy and markets. The duration and path of the conflict remains uncertain, and could continue to fuel, or exacerbate global tensions, energy and other commodity shortages, supply chain disruptions, inflationary pressures, weakening sentiment and growth prospects, market volatility, cyberattacks, and the proliferation of sanctions and trade measures. Europe, in particular, faces significant uncertainty given its dependence on Russia for energy imports and its weakening economic prospects. Furthermore, the Canadian economy is vulnerable to continued trade tensions given the country's trading relationships with the U.S. and China. Tensions remain elevated between China and the U.S. and its allies over a number of issues, including trade, technology, human rights, Taiwan, Hong Kong, and Macau. Tensions between China and its neighbours over territorial claims, and the prospect of even closer relations between China and Russia, add further global and economic uncertainty. Other geopolitical tensions could also add to economic and market uncertainties. In addition, an uncertain geopolitical or economic environment could lead to increases in polarization, social unrest, or terrorism, each of which could have direct or indirect impacts to the bank. More broadly, the future of global trade remains uncertain, as countries look to decrease reliance on the global supply chain and nations with differing values. Increased protectionism and economic nationalism could reshape global alliances as the supply of critical goods of economic and national importance (e.g., energy, semiconductors) remains one of the top priorities of governments. We will continue to monitor these developments and others, and will assess the implications they have on us.
Environmental and social risk (including climate change) 	We, like other organizations, are increasingly under scrutiny to address social and racial inequality and other human rights issues, and failure to do so may result in strategic, regulatory and reputation risks. Risks associated with climate change are evolving as it relates to the global transition to a net-zero economy and physical climate risks (e.g., extreme weather events). Environmental and social risks, including climate change, are each unique and transverse risks impacting our principal risk types in different ways and to varying degrees. While E&S risk manifests itself through credit, reputation, and regulatory compliance risks, the impact of E&S risk also extends to our other principal risks, including systemic, competitive, strategic, legal and regulatory environment, operational, market, liquidity and insurance risks. For details on these risks and how we are managing these risks, refer to the Overview of other risks section.
Digital disruption and innovation 	The COVID-19 pandemic changed the way consumers interact with financial services providers, including increasing demand for digital banking services. While this represents an opportunity for us to leverage our use of technology, the need to meet the rapidly evolving needs of clients and compete with non-traditional competitors has increased our strategic and reputation risks. Additional risks continue to emerge, as demographic trends, evolving client expectations, the increased power to analyze data and the emergence of disruptors are creating competitive pressures across a number of sectors. Moreover, established technology companies, newer competitors, and regulatory changes continue to foster new business models that are challenging or could challenge traditional banks and financial products. Finally, while the adoption of new technologies, such as AI and machine learning, presents opportunities for us, it is resulting or could result in new and complex strategic, operational, regulatory, compliance and reputation risks that would need to be managed effectively.

Top & emerging risks	Description
Privacy, data and third-party related risks 	The protection and responsible use of personal information are critical to maintaining our clients' trust. In addition, the management and governance of our data also remains a top risk given the high value attributed to our data for the insights it can generate for clients and communities. Resulting implications from failing to manage data and privacy risks could include financial loss, theft of intellectual property and/or confidential information, litigation, enhanced regulatory attention and penalties, as well as reputational damage. Effective privacy and information management practices continue to grow in importance, as demonstrated by the continued development of complex regulations in the jurisdictions in which we operate. Our potential exposure to these risks increases as we continue to partner with third-party service providers and adopt new business models and technologies (e.g., cloud computing, AI and machine learning). Threat actors gravitate towards vulnerabilities in an ecosystem, and the weakest link in the supply chain can be a supplier or third-party service provider that may not have sufficiently robust controls. Privacy, data and third-party related risks have been heightened as the use of work from home arrangements remains common practice. Third-party providers critical to our operations are monitored for any impact on their ability to deliver services, including vendors of our third-party providers. For details on how we are managing these risks, refer to the Operational risk section.
Regulatory changes 	The ongoing introduction of new or revised regulations requires enhanced focus across the organization on meeting additional regulatory requirements across the multiple jurisdictions in which we operate. Financial and other reforms that have been implemented or are being implemented, across multiple jurisdictions, such as digital, data and technology reforms, cyber security and anti-money laundering regulations, interest rate benchmark reform, as well as privacy, climate and consumer protection, continue to impact our operations and strategies. For more details, refer to the Legal and regulatory environment risk section.
Culture and conduct risks 	Our Purpose, values and risk principles are key dimensions of our culture. We demonstrate our culture through our conduct – the behaviours, decisions, and actions of the organization and our employees. Culture and conduct risks are considered top risks for the financial services industry due to the impact that our choices, behaviours, and overall risk governance can have on outcomes for our stakeholders. We embed client considerations into our decision-making processes and aim to focus on the fair treatment of clients, and continue to implement regulatory changes that align with this objective. We are responsive to evolving employee needs while expecting employees to always act with integrity. Regulators continue to focus on conduct matters and risks, and heightened expectations generally from regulators could lead to investigations, remediation requirements, higher compliance costs and enforcement actions and fines, and potential criminal prosecutions or imposition of sanctions, including restrictions on our activities. While we take steps to continue to strengthen our conduct practices, and prevent and detect outcomes which could potentially harm clients, employees or the integrity of the markets, such outcomes may not always be prevented or detected. For more details, refer to the Culture and conduct risks section.

Overview

As a global financial institution with a diversified business model, we actively manage a variety of risks to help protect and enable our businesses by following these risk management principles:

Risk management principles

- Effectively balance risk and reward to enable sustainable growth.
- Collectively share the responsibility for risk management.
- Undertake only risks we understand and make thoughtful and future-focused risk decisions.
- Always uphold our Purpose and vision, and consistently abide by our values and Code of Conduct to maintain our reputation and the trust of our clients, colleagues and communities.
- Maintain a healthy and robust control environment to protect our stakeholders.
- Use judgment and common sense.
- Always be operationally prepared and financially resilient for a potential crisis.

The dynamic nature of the financial services industry, and technological innovation, necessitate that our processes, tools and practices are continuously improving and responding to the changing landscape and emerging risks. We seek to accomplish this through an effective and evolving risk management approach. All risk-taking activities and exposures are within the Board-approved risk appetite, and corresponding capital and liquidity requirements. We seek to ensure that our business activities and transactions provide an appropriate balance of return for the risks assumed and the costs incurred. Our organizational design and governance processes are intended to ensure that our Group Risk Management (GRM) function is independent from the businesses it supports.

Risk drivers

We define risk as the potential vulnerabilities in the short-, medium- or long-term that may impact our financial results, financial and operational resilience, reputation, business model, or strategy. Risk can be realized through losses, or an undesirable outcome with respect to volatility of earnings in relation to expected earnings, capital adequacy, or liquidity. Our principal risks include credit, market, liquidity, insurance, operational, regulatory compliance, strategic, reputation, legal and regulatory environment, competitive, and systemic risks, that have been classified into four categories based on the level of control and

influence that we can exert against these risks. These categories are maintained by GRM and reviewed regularly to ensure all principal risks are reflected. This classification methodology provides a common language and discipline for the identification and assessment of risk in existing businesses, new businesses, products or initiatives, as well as acquisitions and alliances.

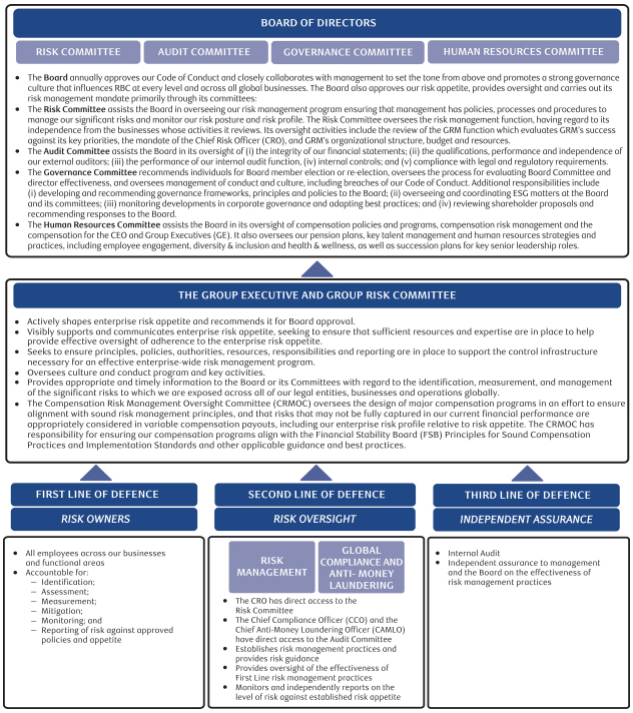


Enterprise risk management

Under the oversight of the Board and senior management, the Enterprise Risk Management Framework (ERMF) provides an overview of our enterprise-wide programs for managing risk, including identifying, assessing, measuring, controlling, monitoring and reporting on the significant risks that face the organization.

Risk governance

We have an effective and well-established governance framework in place so that risks impacting our businesses are identified, appropriately categorized, assessed, managed and communicated to the Board in a timely manner. The risk governance framework has been established, and is maintained in alignment with, the expectations of OSFI, the Basel Committee on Banking Supervision's (BCBS) corporate governance principles, and the requirements and expectations of other regulators in the jurisdictions in which we conduct business, and in accordance with industry best practices. The Board oversees the implementation of our risk management framework, while employees at all levels of the organization are responsible for managing the day-to-day risks that arise in the context of their mandates. As illustrated below, we use the three lines of defence governance model so that risks are appropriately and adequately managed throughout the enterprise to achieve our strategic objectives.

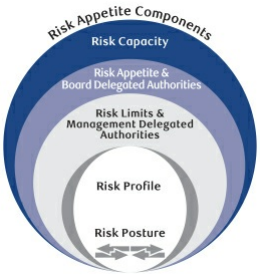

BOARD OF DIRECTORS
RISK COMMITTEE
AUDIT COMMITTEE
GOVERNANCE COMMITTEE
HUMAN RESOURCES COMMITTEE
The Board annually approves our Code of Conduct and closely collaborates with management to set the tone from above and promotes a strong governance culture that influences RBC at every level and across all global businesses. The Board also approves our risk appetite, provides oversight and carries out its risk management mandate primarily through its committees:
The Risk Committee assists the Board in overseeing our risk management program ensuring that management has policies, processes and procedures to manage our significant risks and monitor our risk posture and risk profile. The Risk Committee oversees the risk management function, having regard to its independence from the businesses whose activities it reviews. Its oversight activities include the review of the GRM function which evaluates GRM's success against its key priorities, the mandate of the Chief Risk Officer (CRO), and GRM's organizational structure, budget and resources.
The Audit Committee assists the Board in its oversight of (i) the integrity of our financial statements; (ii) the qualifications, performance and independence of our external auditors; (iii) the performance of our internal audit function, (iv) internal controls; and (v) compliance with legal and regulatory requirements.
The Governance Committee recommends individuals for Board member election or re-election, oversees the process for evaluating Board Committee and director effectiveness, and oversees management of conduct and culture, including breaches of our Code of Conduct. Additional responsibilities include (i) developing and recommending governance frameworks, principles and policies to the Board; (ii) overseeing and coordinating ESG matters at the Board and its committees; (iii) monitoring developments in corporate governance and adopting best practices; and (iv) reviewing shareholder proposals and recommending responses to the Board.
The Human Resources Committee assists the Board in its oversight of compensation policies and programs, compensation risk management and the compensation for the CEO and Group Executives (GE). It also oversees our pension plans, key talent management and human resources strategies and practices, including employee engagement, diversity & inclusion and health & wellness, as well as succession plans for key senior leadership roles.
THE GROUP EXECUTIVE AND GROUP RISK COMMITTEE
Actively shapes enterprise risk appetite and recommends it for Board approval.
Visibly supports and communicates enterprise risk appetite, seeking to ensure that sufficient resources and expertise are in place to help provide effective oversight of adherence to the enterprise risk appetite.
Seeks to ensure principles, policies, authorities, resources, responsibilities and reporting are in place to support the control infrastructure necessary for an effective enterprise-wide risk management program.
Oversees culture and conduct program and key activities.
Provides appropriate and timely information to the Board or its Committees with regard to the identification, measurement, and management of the significant risks to which we are exposed across all of our legal entities, businesses and operations globally.
The Compensation Risk Management Oversight Committee (CRMOC) oversees the design of major compensation programs in an effort to ensure alignment with sound risk management principles, and that risks that may not be fully captured in our current financial performance are appropriately considered in variable compensation payouts, including our enterprise risk profile relative to risk appetite. The CRMOC has responsibility for ensuring our compensation programs align with the Financial Stability Board (FSB) Principles for Sound Compensation Practices and Implementation Standards and other applicable guidance and best practices.
FIRST LINE OF DEFENCE
RISK OWNERS
All employees across our businesses and functional areas
Accountable for:
– Identification;
– Assessment;
– Measurement;
– Mitigation;
– Monitoring; and
– Reporting of risk against approved policies and appetite
SECOND LINE OF DEFENCE
RISK OVERSIGHT
RISK MANAGEMENT
GLOBAL COMPLIANCE AND ANTI- MONEY LAUNDERING
The CRO has direct access to the Risk Committee
The Chief Compliance Officer (CCO) and the Chief Anti-Money Laundering Officer (CAMLO) have direct access to the Audit Committee
Establishes risk management practices and provides risk guidance
Provides oversight of the effectiveness of First Line risk management practices
Monitors and independently reports on the level of risk against established risk appetite
THIRD LINE OF DEFENCE
INDEPENDENT ASSURANCE
Internal Audit
Independent assurance to management and the Board on the effectiveness of risk management practices

Risk appetite

Effective risk management protects us from unacceptable losses or undesirable outcomes with respect to earnings volatility, capital adequacy or liquidity, reputation risk or other risks while supporting and enabling our overall business strategy. It requires the clear articulation of our risk appetite, which is the amount and type of risk that we are able and willing to accept in the pursuit of our business objectives. It reflects our self-imposed upper bound to risk-taking, set at levels inside of regulatory limits and constraints, and influences our risk management philosophy, Code of Conduct, business practices and resource allocation. It provides clear boundaries and sets an overall tone for balancing risk-reward trade-offs to ensure the long-term viability of the organization.

Our risk appetite is integrated into our strategic, financial, and capital planning processes, as well as ongoing business decision-making processes and is reviewed and approved annually by the Board.

Our Enterprise Risk Appetite Framework (ERAF) outlines the foundational aspects of our approach to risk appetite, articulates our quantitative and qualitative risk appetite statements and their supporting measures and associated constraints, which can be applied at the enterprise, business segment, business unit and legal entity level, and describes our requirements and expectations to embed effective risk appetite practices throughout the organization.



Risk appetite statements

Quantitative statements

- Manage earnings volatility and exposure to future losses under normal and stressed conditions.
- Avoid excessive concentrations of risk.
- Ensure capital adequacy and sound management of liquidity and funding risk.
- Ensure sound management of operational and regulatory compliance risk.
- Maintain strong credit ratings and a risk profile in the top half of our peer group.

Qualitative statements

- Always uphold our Purpose and vision and consistently abide by our values and Code of Conduct to maintain our reputation and the trust of our clients, colleagues, and communities.
- Undertake only risk we understand. Make thoughtful and future-focused risk decisions, taking environmental and social considerations into account.
- Effectively balance risk and reward to enable sustainable growth.
- Maintain a healthy and robust control environment to protect our stakeholders.
- Always be operationally prepared and financially resilient for a potential crisis.

The allocation of our risk appetite across the bank is supported by the establishment of delegated authorities or risk limits. These delegated authorities or risk limits represent the maximum level of risk permitted for a line of business, portfolio, individual or group and are used to govern ongoing operations. Risk posture, the anticipated shift in risk profile as a result of changes in objectives, strategies, and external factors, is used to provide insights on key areas that may require management attention to ensure strategies are able to be executed successfully within our risk appetite.

Risk measurement

Quantifying risk is a key component of our enterprise-wide risk and capital management processes. Risk measurement and planning processes are integrated across the enterprise, especially in regards to forward-looking projections and analyses, including but not limited to, stress testing, recovery and resolution planning, and credit provisioning. The degree of integration across our Finance and Risk functions continues to increase in measuring both financial and risk performance.

Certain risks, such as credit, market, liquidity and insurance risks, can be more easily quantified than others, such as operational, reputation, strategic, legal, and regulatory compliance risks. For the risks that are more difficult to quantify, greater emphasis is placed on qualitative risk factors and assessment of activities to gauge the overall level of risk. In addition, judgmental risk measures and techniques such as stress testing, and scenario and sensitivity analyses can be used to assess and measure risks, and we are continuously evolving our risk measures and techniques to manage our risks. Our primary methods for measuring risk include:

- Quantifying expected loss: losses that are statistically expected to occur as a result of conducting business in a given time period;
- Quantifying unexpected loss: an estimate of the deviation of actual earnings from expected earnings, over a specified time horizon;
- Stress testing: evaluates, from a forward looking perspective, the potential effects of a set of specified changes in risk factors, corresponding to exceptional but plausible adverse economic and financial market events; and
- Back-testing: the realized values are compared to the parameter estimates that are currently used in an effort to ensure the parameters remain appropriate for regulatory and economic capital calculations.

Stress testing

Stress testing is an important component of our risk management framework. Stress testing results are used for:

- Assessing the viability of long-term business plans and strategies;
- Monitoring our risk profile relative to our risk appetite in terms of earnings and capital at risk;
- Setting limits;
- Identifying key risks to, and potential shifts in, our capital and liquidity levels, as well as our financial position;
- Enhancing our understanding of available mitigating actions in response to potential adverse events; and
- Assessing the adequacy of our capital and liquidity levels.

Our enterprise-wide stress tests evaluate key balance sheet, income statement, leverage, capital, and liquidity impacts arising from risk exposures and changes in earnings. The results are used by the Board, Group Risk Committee (GRC) and senior management risk committees to understand our performance drivers under stress, and review stressed capital, leverage, and liquidity ratios against regulatory thresholds and internal limits. The results are also incorporated into our Internal Capital Adequacy Assessment Process (ICAAP) and capital plan analyses.

We evaluate a number of enterprise-wide stress scenarios over a multi-year horizon, featuring a range of severities. Our Board reviews the recommended scenarios, and GRM leads the scenario assessment process. Results from across the organization are integrated to develop an enterprise-wide view of the impacts, with input from subject matter experts in GRM, Corporate Treasury, Finance, and Economics. Generally, our stress testing scenarios evaluate global recessions, equity market corrections, elevated debt levels, trade policies, changes in interest rates, real estate price corrections, and shocks to credit spreads and commodity markets, among other factors. During our fiscal 2022 stress testing exercises, we addressed several emerging risks inclusive of inflation risk, supply chain pressures as well as physical and transitional climate risk, with a focus on the impacts of these risks on revenue, net income and capital projections.

Ongoing stress testing and scenario analyses within specific risk types, such as market risk (including Interest Rate Risk in the Banking Book (IRRBB)), liquidity risk, retail and wholesale credit risk, operational risk, and insurance risk, supplement and support our enterprise-wide analyses. Results from these risk-specific programs are used in a variety of decision-making processes including risk limit setting, portfolio composition evaluation, risk appetite articulation and business strategy implementation.

In addition to ongoing enterprise-wide and risk-specific stress testing programs, we use ad hoc and reverse stress testing to deepen our knowledge of the risks we face. Ad hoc stress tests are one-off analyses used to investigate developing conditions or to stress a particular portfolio in more depth. Reverse stress tests, starting with a severe outcome and aiming to reverse-engineer scenarios that might lead to it, are used in risk identification and understanding of risk/return boundaries.

In addition to internal stress tests, we participate in a number of regulator-required stress test exercises, on a periodic basis, across several jurisdictions.

Model governance and validation

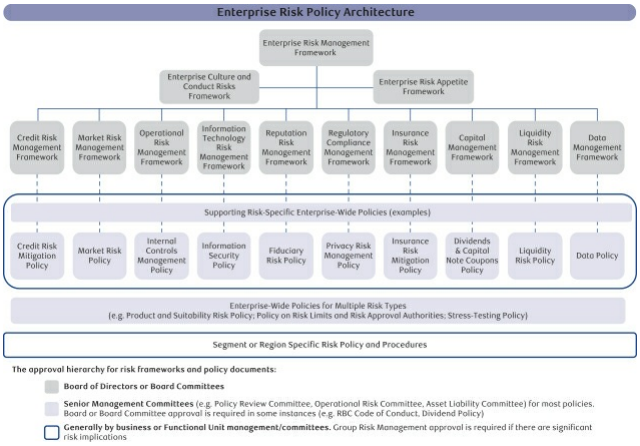
Quantitative models are used for many purposes including, but not limited to, the valuation of financial products, the identification, measurement and management of different types of risk, stress testing, assessing capital adequacy, informing business and risk decisions, measuring compliance with internal limits, meeting financial reporting and regulatory requirements, and issuing public disclosures.

Model risk is the risk of adverse financial and/or reputational consequences to the enterprise arising from the use or misuse of a model at any stage throughout its life cycle and is managed through our model risk governance and oversight structure. The governance and oversight structure, which is implemented through our three lines of defence governance model, is founded on the basis that model risk management is a shared responsibility across the three lines spanning all stages of the model's life cycle. We continue to evolve our governance model to seek to take into account any new risk considerations that may emerge from the growing use of AI methods and applications in our models across our organization.

Prior to being used, models are subject to independent validation and approval by our enterprise model risk management function, a team of modelling professionals with reporting lines independent of those of the model owners, developers and users. The validation seeks to ensure that models are sound and capable of fulfilling their intended use. In addition to independently validating models prior to use, our enterprise model risk management function provides controls that span the life-cycle of a model, including model change management procedures, requirements for ongoing monitoring, and annual assessments to ensure each model continues to serve its intended purpose.

Risk control

Our enterprise-wide risk management approach is supported by a comprehensive set of risk controls that are defined in our ERMF. The ERMF serves as the foundation for our approach to risk management and sets the expectations for the development and communication of policies, the establishment of formal independent risk review and approval processes, and the establishment of delegated risk approval authorities and risk limits. The ERMF is further reinforced and supported by a number of additional Board-approved risk frameworks, various policies thereunder and a comprehensive set of risk controls. Together, our risk frameworks and supporting policies provide direction and insight on how respective risks are identified, assessed, measured, managed, mitigated, monitored and reported. The enterprise-wide policies are considered our minimum requirements, articulating the parameters within which business groups and employees must operate.



Delegated risk approval authorities and risk limits

Risk Appetite is designed to account for strategic and forward-looking considerations whereas delegated authorities and risk limits are used to govern and monitor our day-to-day business activities. Risk Appetite is supported by Risk Approval Authorities delegated by the Board to senior management which provide thresholds for escalation of exposures and transactions to the Risk Committee of the Board for review and approval. The allocation of Risk Appetite and Board Delegated Authorities may be supported by the establishment of management delegated authorities and/or risk limits. These authorities and limits are used to implement risk management strategies to diversify risks, reduce unexpected losses and/or promote stability of earnings, govern on-going operations and monitor utilization of risk limits. Excesses to Management Delegated Authorities and risk limits can act as early warning indicators for Risk Appetite constraints and Board Delegated Authorities thus allowing for timely management attention. Senior management can delegate some or all of their authorities onwards to others in the organization. The delegated authorities enable the approval of single name, geographic and industry sectors, and product and portfolio exposures within defined parameters and limits. They are also used to manage concentration risk, establish underwriting and inventory limits for trading and investment banking activities and set market risk tolerances.

Risk review and approval processes

Risk review and approval processes provide an important control mechanism and are established by GRM based on the nature, size and complexity of the risk involved. In general, the risk review and approval process involves a formal review and approval by an individual, group or committee that is independent from the originator. The approval responsibilities are governed by the Enterprise Risk Appetite Framework and delegated authorities and risk limits are based on the following categories: transactions, projects and initiatives, and new products and services.

Risk monitoring and reporting

Enterprise and business segment level risk monitoring and internal reporting are critical components of our enterprise risk management program and support the ability of senior management and the Board to effectively perform their risk management and oversight responsibilities. In addition, we publish a number of external reports on risk matters to comply with regulatory requirements. The Risk Committee of the Board receives a CRO report at each meeting that has been reviewed by senior management, and which includes, among others, top and emerging risks, industry trends or other notable items. On a quarterly basis, we provide our Enterprise Risk Report to senior management and the Risk Committee of the Board which includes, among others, top and emerging risks, risk profile relative to our risk appetite, portfolio quality metrics and a range of risks we face along with an analysis of the related issues, key trends and, when required, management actions. On an annual basis, we provide a benchmarking review to the Board which compares our performance to peers across a variety of risk metrics and includes a composite risk scorecard which provides an objective measure of our ranking relative to the peer group. In addition to our regular risk monitoring, other risk-specific presentations are provided to, and discussed with, senior management and the Board on top and emerging risks or changes in our risk profile.

The shaded text along with the tables specifically marked with an asterisk (*) in the following sections of the MD&A represent our disclosures on credit, market and liquidity and funding risks in accordance with IFRS 7, *Financial Instruments: Disclosures*, and include discussion on how we measure our risks and the objectives, policies and methodologies for managing these risks. Therefore, these shaded text and marked tables represent an integral part of our 2022 Annual Consolidated Financial Statements.

Transactional/positional risk drivers

Credit risk

Credit risk is the risk of loss associated with an obligor's potential inability or unwillingness to fulfill its contractual obligations on a timely basis and may arise directly from the risk of default of a primary obligor (e.g., issuer, debtor, counterparty, borrower or policyholder), indirectly from a secondary obligor (e.g., guarantor or reinsurer), through off-balance sheet exposures, contingent credit risk, associated credit risk and/or transactional risk. Credit risk includes counterparty credit risk arising from both trading and non-trading activities.

The responsibility for managing credit risk is shared broadly following the three lines of defence governance model. The allocation of the Board approved credit risk appetite is supported by the establishment of risk approval authorities and risk limits, delegated by the Board to the President & CEO and CRO. Credit transactions in excess of these authorities must be approved by the Risk Committee of the Board. To facilitate day-to-day business activities, the CRO has been empowered to further delegate credit risk approval authorities to individuals within GRM, the business segments, and functional units as necessary.

We balance our risk and return by setting the following objectives for the management of credit risk:

- Ensuring credit quality is not compromised for growth;
- Mitigating credit risk in transactions, relationships and portfolios;
- Avoiding excessive concentrations in correlated credit risks;
- Using our credit risk rating and scoring systems or other approved credit risk assessment or rating methodologies, policies and tools;
- Pricing appropriately for the credit risk taken;
- Detecting and preventing inappropriate credit risk through effective systems and controls;
- Applying consistent credit risk exposure measurements;
- Ongoing credit risk monitoring and administration;
- Transferring credit risk to third parties where appropriate through approved credit risk mitigation techniques (e.g., sale, hedging, insurance, securitization); and
- Avoiding activities that are inconsistent with our values, Code of Conduct or policies.

The Enterprise Credit Risk Management Framework (ECRMF) describes the principles, methodologies, systems, roles and responsibilities, reports and controls that exist for managing credit risk within the enterprise. Additional supporting policies exist that are designed to provide further clarification of roles and responsibilities, acceptable practices, limits and key controls within the enterprise.

Credit risk measurement

We quantify credit risk at both the individual obligor and portfolio levels to manage expected credit losses and minimize unexpected losses to limit earnings volatility and ensure we are adequately capitalized.

We employ a variety of risk measurement methodologies to measure and quantify credit risk for our wholesale and retail credit portfolios. The wholesale portfolio is comprised of businesses, sovereigns, public sector entities, banks and other financial institutions, as well as certain HNW individuals. The retail portfolio is comprised of residential mortgages, personal loans, credit cards, and small business loans. Our credit risk rating systems are designed to assess and quantify the risk inherent in credit activities in an accurate and consistent manner. The resulting ratings and scores are then used for both client- and transaction-level risk decision-making and as key inputs for our risk measurement and capital calculations.

Measurement of economic and regulatory capital

Economic capital, which is our internal quantification of risks, is used for limit setting. It is also used for internal capital adequacy and allocation of capital to the Insurance segment. Our methodology for allocating capital to our business segments, other than Insurance, is based on regulatory requirements. For further details, refer to the Capital management section.

In measuring credit risk to determine regulatory capital, two principal approaches are available: Internal Ratings Based (IRB) Approach and Standardized Approach.

The Standardized Approach applies primarily to our Caribbean banking operations and City National and is based on risk weights prescribed by OSFI that are used to calculate RWA for credit risk exposure.

The IRB Approach, which applies to most of our credit risk exposures, utilizes three key parameters which form the basis of our credit risk measures for both regulatory and economic capital.

- Probability of default (PD): An estimated percentage that represents the likelihood of default within a given time period of an obligor for a specific rating grade or for a particular pool of exposure.
- Exposure at default (EAD): An amount expected to be owed by an obligor at the time of default.
- Loss given default (LGD): An estimated percentage of EAD that is not expected to be recovered during the collections and recovery process.

These parameters are determined based primarily on historical experience from internal credit risk rating systems in accordance with supervisory standards.

Each credit facility is assigned an LGD rate that is largely driven by factors that impact the extent of losses anticipated in the event the obligor defaults. These factors mainly include seniority of debt, collateral and the industry sector in which the obligor operates. Estimated LGD rates draw primarily on internal loss experiences. Where we have limited internal loss data, we also refer to appropriate external data to supplement the estimation process. LGD rates are estimated to reflect conditions that might be expected to prevail in a period of an economic downturn, with additional conservatism added to reflect data limitations and statistical uncertainties identified in the estimation process.

EAD is estimated based on the current exposure to the obligor and the possible future changes in that exposure driven by factors such as the nature of the credit commitment. As with LGD, rates are estimated to reflect an economic downturn, with added conservatism to reflect data and statistical uncertainties identified in the modelling process.

Estimates of PD, LGD and EAD are reviewed, and then validated and back-tested by an independent validation team within the bank, on an annual basis. In addition, quarterly monitoring and back-testing is performed by the estimation team. These ratings and risk measurements are used to determine our expected losses as well as economic and regulatory capital, setting of risk limits, portfolio management and product pricing.

Financial and regulatory measurement distinctions

Expected loss models are used for both regulatory capital and accounting purposes. Under both models, expected losses are calculated as the product of PD, LGD and EAD. However, there are certain key differences under current Basel and IFRS reporting frameworks which could lead to significantly different expected loss estimates, including:

- Basel PDs are based on long-run averages over an entire economic cycle. IFRS PDs are based on current conditions, adjusted for estimates of future conditions that will impact PD under probability-weighted macroeconomic scenarios.
- Basel PDs consider the probability of default over the next 12 months. IFRS PDs consider the probability of default over the next 12 months only for instruments in stage 1. Expected credit losses for instruments in stage 2 are calculated using lifetime PDs.
- Basel LGDs are based on severe but plausible downturn economic conditions. IFRS LGDs are based on current conditions, adjusted for estimates of future conditions that will impact LGD under probability-weighted macroeconomic scenarios.

For further details, refer to the Critical accounting policies and estimates section.

Gross credit risk exposure

Gross credit risk is categorized as i) lending-related and other credit risk or ii) trading-related credit risk; and is calculated based on the Basel III framework. Under this method, EAD for all lending-related and other credit transactions and trading-related repo-style transactions is calculated before taking into account any collateral and is inclusive of an estimate of potential future changes to that credit exposure. EAD for derivatives is calculated inclusive of collateral in accordance with regulatory guidelines.

Lending-related and other credit risk includes:

- Loans and acceptances outstanding, undrawn commitments, and other exposures, including contingent liabilities such as letters of credit and guarantees, debt securities carried at FVOCI or amortized cost and deposits with financial institutions. Undrawn commitments represent an estimate of the contractual amount that may be drawn upon at the time of default of an obligor.

Trading-related credit risk includes:

- Repo-style transactions, which include repurchase and reverse repurchase agreements and securities lending and borrowing transactions. For repo-style transactions, gross exposure represents the amount at which securities were initially financed, before taking collateral into account.
- Derivative amounts which represent the credit equivalent amount, as defined by OSFI as the replacement cost plus an add-on amount for potential future credit exposure, scaled by a regulatory factor. For further details on replacement cost and credit equivalent amounts, refer to Note 9 of our 2022 Annual Consolidated Financial Statements.

Credit risk assessment

Wholesale credit risk

The wholesale credit risk rating system is designed to measure the credit risk inherent in our wholesale credit activities.

Each obligor is assigned a borrower risk rating (BRR), reflecting an assessment of the credit quality of the obligor. Each BRR has a PD calibrated against it. The BRR differentiates the riskiness of an obligor and represents our evaluation of the obligor's ability and willingness to meet its contractual obligations on time over a three year time horizon. The assignment of BRRs is based on the evaluation of the obligor's business risk and financial risk through fundamental credit analysis, as well as data-driven modelling. The determination of the PD associated with each BRR relies primarily on internal default history since 2006. PD estimates are designed to be a long-run average of our experience across the economic cycle in accordance with regulatory guidelines.

Our rating system is designed to stratify obligors into 22 grades. The following table aligns the relative rankings of our 22-grade internal risk ratings with the external ratings used by S&P and Moody's.

Internal ratings map* Table 41

Ratings	PD Bands		BRR	S&P	Moody's	Description
	Business and Bank	Sovereign				
1	0.0000% – 0.0300%	0.0000% – 0.0150%	1+	AAA	Aaa	Investment Grade
2	0.0000% – 0.0300%	0.0151% – 0.0250%	1H	AA+	Aa1	
3	0.0000% – 0.0350%	0.0251% – 0.0350%	1M	AA	Aa2	
4	0.0351% – 0.0450%		1L	AA-	Aa3	
5	0.0451% – 0.0550%		2+H	A+	A1	
6	0.0551% – 0.0650%		2+M	A	A2	
7	0.0651% – 0.0750%		2+L	A-	A3	
8	0.0751% – 0.0850%		2H	BBB+	Baa1	
9	0.0851% – 0.1000%		2M	BBB	Baa2	
10	0.1001% – 0.1770%		2L	BBB-	Baa3	
11	0.1771% – 0.3705%		2-H	BB+	Ba1	Non-investment Grade
12	0.3706% – 0.7065%		2-M	BB	Ba2	
13	0.7066% – 1.1600%		2-L	BB-	Ba3	
14	1.1601% – 1.6810%		3+H	B+	B1	
15	1.6811% – 2.3490%		3+M	B	B2	
16	2.3491% – 4.4040%		3+L	B-	B3	
17	4.4041% – 7.0010%		3H	CCC+	Caa1	
18	7.0011% – 13.1760%		3M	CCC	Caa2	
19	13.1761% – 24.9670%		3L	CCC-	Caa3	
20	24.9671% – 99.9990%		4	CC	Ca	
21	100%		5	D	C	Impaired
22	100%		6	D	C	

* This table represents an integral part of our 2022 Annual Consolidated Financial Statements.

Counterparty credit risk

Counterparty credit risk is the risk that a party with whom the bank has entered into a financial or non-financial contract will fail to fulfill its contractual agreement and default on its obligation. It incorporates not only the contract's current value, but also considers how that value can move as market conditions change. Counterparty credit risk usually arises from trading-related derivative and repo-style transactions. Derivative transactions include forwards, futures, swaps and options, and can have underlying references that are either financial (e.g., interest rate, foreign exchange, credit, or equity) or non-financial (e.g., precious metal and commodities). For further details on our derivative instruments and credit risk mitigation, refer to Note 9 of our 2022 Annual Consolidated Financial Statements.

Trading counterparty credit activities are undertaken in a manner consistent with the relevant requirements under the ECRMF and the Enterprise Market Risk Management Framework (EMRMF), in line with our credit risk management policy documents and with approval in accordance with the appropriate delegated authorities.

The primary risk mitigation techniques for trading counterparty credit risk are close-out netting and collateralization. Close-out netting considers the net value of contractual obligations between counterparties in a default situation, thereby reducing overall credit exposure. Collateralization is when a borrower pledges assets as security, which provides recourse to the lender in the event of default. The policies that we maintain in relation to the recognition of risk mitigation from these techniques incorporate such considerations as:

- The use of standardized agreements such as the International Swaps and Derivatives Association Master Agreement and Credit Support Annex;
- Restricting eligible collateral to high quality liquid assets, primarily cash and highly-rated government securities, subject to appropriate haircuts; and
- The use of initial margin and variation margin arrangements in accordance with regulatory requirements and internal risk standards.

Similarly, for securities finance and repurchase trading activity we mitigate counterparty credit risk via the use of standardized securities finance agreements, and by taking collateral generally in the form of eligible liquid securities.

We also mitigate counterparty credit risk through the use of central counterparties (CCPs). These highly-regulated entities intermediate trades between participating bilateral counterparties and mitigate credit risk through the use of initial and variation margin and the ability to net offsetting trades amongst participants. The specific structure and capitalization, including contingent capital arrangements, of individual CCPs are analyzed as part of assigning an internal counterparty credit risk rating and determining appropriate counterparty credit risk limits.

Wrong-way risk

Wrong-way risk is the risk that exposure to a counterparty is adversely correlated with the credit quality of that counterparty. There are two types of wrong-way risk:

- Specific wrong-way risk, which exists when our exposure to a particular counterparty is positively correlated with the PD of the counterparty due to the nature of our transactions with them (e.g., loans collateralized by shares or debt issued by the counterparty or a related party). Specific wrong-way risk over-the-counter (OTC) derivative trades are done on an exception basis only, and are permitted only when explicitly pre-approved by GRM. Factors considered in reviewing such trades include the credit quality of the counterparty, the nature of the asset(s) underlying the derivative and the existence of credit mitigation.
- General wrong-way risk, which exists when there is a positive correlation between the PD of the counterparties and general macroeconomic or market factors. This typically occurs with derivatives (e.g., the size of the exposure increases) or with collateralized transactions (e.g., the value of the collateral declines). We monitor general wrong-way counterparty credit risk using a variety of metrics including stress scenarios, investment strategy concentration, the ability of counterparties to generate cash and liquidity, liquidity of the collateral and terms of financing.

Retail credit risk

Credit scoring is the primary risk rating system for assessing obligor and transaction risk for retail exposures. Scoring models use internal and external data to assess and score borrowers, predict future performance and manage limits for existing loans and collection activities. Credit scores are one of the factors employed in the acquisition of new clients and management of existing clients. The credit score of the borrower is used to assess the predicted credit risk for each independent acquisition or account management action, leading to an automated decision or guidance for an adjudicator. Credit scoring improves credit decision quality, adjudication timeframes and consistency in the credit decision process and facilitates risk-based pricing. Since the onset of the COVID-19 pandemic, we adapted our retail credit risk methodology by enhancing our product level credit strategies with advanced analytics and portfolio monitoring.

To arrive at a retail risk rating, borrower scores are categorized and associated with PDs for further grouping into risk rating categories. The following table maps PD bands to various summarized risk levels for retail exposures:

Internal ratings map* — **Table 42**

PD bands	Description
0.030% – 3.844%	Low risk
3.845% – 6.786%	Medium risk
6.787% – 99.99%	High risk
100%	Impaired/Default

* This table represents an integral part of our 2022 Annual Consolidated Financial Statements.

Credit risk mitigation

We seek to reduce our exposure to credit risk through a variety of means, including the structuring of transactions and the use of collateral.

Structuring of transactions

Specific credit policies and procedures set out the requirements for structuring transactions. Risk mitigants include the use of guarantees, collateral, seniority, LTV requirements and covenants. Product-specific guidelines set out appropriate product structuring as well as client and guarantor criteria.

Collateral

When we advance credit, we often require obligors to pledge collateral as security. The extent of risk mitigation provided by collateral depends on the amount, type and quality of the collateral taken. Specific requirements relating to collateral valuation and management are set out in our credit risk management policies.

The types of collateral used to secure credit or trading facilities within the bank are varied. For example, our securities financing and collateralized OTC derivatives activities are primarily secured by cash and highly-rated liquid government and agency securities. Wholesale lending to business clients is often secured by pledges of the assets of the business, such as accounts receivable, inventory, operating assets and commercial real estate. In Canadian Banking and Wealth Management, collateral typically consists of a pledge over a real estate property, or a portfolio of debt securities and equities trading on a recognized exchange.

- We employ a risk-based approach to property valuation. Property valuation methods include automated valuation models (AVM) and appraisals. An AVM is a tool that estimates the value of a property by reference to market data including sales of comparable properties and price trends specific to the Metropolitan Statistical Area in which the property being valued is located. Using a risk-based approach, we also employ appraisals which can include drive-by or full on-site appraisals.
- We continue to actively manage our entire mortgage portfolio and perform stress testing, based on a combination of increasing unemployment, rising interest rates and a downturn in real estate markets.
- We are compliant with regulatory requirements that govern residential mortgage underwriting practices, including LTV parameters and property valuation requirements.

There were no significant changes regarding our risk management policies on collateral or to the quality of the collateral held during the period.

Credit risk approval

The Board, GE, GRC and other senior management committees work together to ensure the ECRMF and supporting policies, processes and procedures exist to manage credit risk and approve related credit risk limits. Reports are provided to the Board, the GRC, and senior executives to keep them informed of our risk profile, including significant credit risk issues, shifts in exposures and trending information, to ensure appropriate and timely actions can be taken where necessary. Our enterprise-wide credit risk policies set out the minimum requirements for the management of credit risk in a variety of borrower, transactional and portfolio management contexts.

Transaction approval

Credit transactions are governed by our RBC Enterprise Policy on Risk Limits and Risk Approval Authorities that captures the limits delegated to management and the credit rules policy, which outlines the minimum standards for managing credit risk at the individual client relationship and/or transaction level. The credit rules policy is further supported by business and/or product-specific policies and guidelines as appropriate. Transaction approvals are subject to delegated risk approval authorities. If a transaction exceeds senior management's authorities, the approval of the Risk Committee of the Board is required.

Product approval

Proposals for credit products and services are comprehensively reviewed and approved under a risk assessment framework and are subject to risk approval authorities which increase as the level of risk increases. New and amended products must be reviewed relative to all risk drivers, including credit risk. All existing products must be reviewed following a risk-based assessment approach on a regular basis.

Credit risk limits

- The allocation of risk appetite and Board delegated authorities are supported by the establishment of risk limits which take into account both regulatory constraints and internal risk management judgment. Risk limits are established at the following levels: single name limits, regional, country and industrial sector limits (notional and economic capital), regulatory large exposure limits, product and portfolio limits, and underwriting and distribution risk limits. These limits apply across all businesses, portfolios, transactions and products.
- We actively manage credit exposures and limits to ensure alignment with our risk appetite, to maintain our target business mix and to ensure that there is no undue concentration risk.
  - Concentration risk is defined as the risk arising from large exposures that are highly correlated such that their ability to meet contractual obligations could be similarly affected by changes in economic, political or other risk drivers.
  - Credit concentration limits are reviewed on a regular basis after taking into account business, economic, financial and regulatory environments.

Credit risk administration

Loan forbearance

In our overall management of borrower relationships, economic or legal reasons may necessitate forbearance to certain clients with respect to the original terms and conditions of their loans. We have specialized groups and formalized policies that direct the management of high risk, delinquent or defaulted borrowers. We strive to identify borrowers in financial difficulty early and modify their loan terms to minimize losses and assist clients in need. A forbearance agreement may be entered into with the borrower where we will forbear from enforcing on security in exchange for concessions made by the borrower. In these circumstances, a borrower may be granted concessions that would not otherwise be considered. Examples of such concessions to retail borrowers may include rate reduction, payment deferral and term extensions. Concessions to wholesale borrowers may include payment deferral, restructuring the agreements, modifying the original terms of the agreement and/or relaxation of covenants. For both retail and wholesale loans, the appropriate remediation techniques are based on the individual borrower's situation, our policy and the client's willingness and capacity to meet the new arrangement.

Credit risk exposure by portfolio, sector and geography

The following table presents our credit risk exposures under the Basel regulatory defined classes and reflects EAD. The classification of our sectors aligns with our view of credit risk by industry.

Credit risk exposure by portfolio, sector and geography — Table 43

As at

(Millions of Canadian dollars)	October 31 2022						October 31 2021					
	Credit risk (1), (2)			Counterparty credit risk (5)			Credit risk (1), (2)			Counterparty credit risk (5)		
	On-balance sheet amount	Off-balance sheet amount (3) Undrawn	Off-balance sheet amount (3) Other (4)	Repo-style transactions	Derivatives	Total exposure	On-balance sheet amount	Off-balance sheet amount (3) Undrawn	Off-balance sheet amount (3) Other (4)	Repo-style transactions	Derivatives	Total exposure
Retail												
Residential secured (6)	$ 393,346	$ 107,604	$ –	$ –	$ –	$ 500,950	$ 362,793	$ 96,609	$ –	$ –	$ –	$ 459,402
Qualifying revolving (7)	32,474	94,949	–	–	–	127,423	30,080	90,932	–	–	–	121,012
Other retail	98,070	19,993	136	–	–	118,199	85,362	19,422	146	–	–	104,930
Total retail	$ 523,890	$ 222,546	$ 136	$ –	$ –	$ 746,572	$ 478,235	$ 206,963	$ 146	$ –	$ –	$ 685,344
Wholesale												
Agriculture	$ 10,417	$ 2,089	$ 36	$ –	$ 161	$ 12,703	$ 9,400	$ 1,756	$ 30	$ –	$ 84	$ 11,270
Automotive	8,919	9,184	317	–	1,506	20,026	6,288	9,184	173	–	1,124	16,769
Banking (8)	73,335	5,487	1,036	111,559	38,830	230,247	45,906	4,545	765	117,996	30,888	200,100
Consumer discretionary	19,666	9,297	569	–	949	30,481	14,792	9,380	573	–	698	25,443
Consumer staples	7,103	6,750	346	–	1,923	16,122	6,254	6,949	180	–	1,058	14,441
Oil and gas	6,086	11,272	1,923	–	5,959	25,240	5,678	10,328	1,474	–	7,493	24,973
Financial services	45,394	25,017	3,539	69,790	24,546	168,277	32,977	19,252	2,623	64,593	16,262	135,707
Financing products (8)	5,762	2,352	163	237	780	9,294	7,868	2,405	485	388	848	11,994
Forest products	1,143	1,033	230	–	78	2,484	969	991	201	–	17	2,178
Governments (8)	279,401	5,678	1,563	18,745	6,290	311,677	287,806	4,794	1,533	23,536	5,692	323,361
Industrial products	10,755	9,319	601	–	1,216	21,891	7,308	8,933	594	–	811	17,646
Information technology	5,291	7,144	298	55	1,908	14,696	3,591	5,715	237	49	5,447	15,039
Investments	23,764	3,946	669	157	458	28,994	22,238	3,201	412	12	174	26,037
Mining and metals	2,377	4,259	945	–	467	8,048	993	3,730	952	–	237	5,912
Public works and infrastructure	2,614	2,417	497	–	144	5,672	1,427	1,963	391	–	239	4,020
Real estate and related	89,926	18,295	1,872	–	818	110,911	76,141	14,223	1,568	–	1,176	93,108
Other services	27,839	13,425	2,848	33	852	44,997	23,872	13,362	1,860	47	1,316	40,457
Telecommunication and media	7,301	8,298	79	–	2,751	18,429	5,294	9,748	598	–	1,976	17,616
Transportation	6,394	6,386	930	–	2,069	15,779	6,151	6,832	1,319	–	1,426	15,728
Utilities	12,318	20,651	5,275	–	5,081	43,325	9,059	17,152	4,131	–	4,464	34,806
Other sectors	4,113	1,700	71	73	20,126	26,083	3,084	1,139	7	7	6,960	11,197
Total wholesale	$ 649,918	$ 173,999	$ 23,798	$ 200,649	$ 117,012	$ 1,165,376	$ 577,096	$ 155,582	$ 20,106	$ 206,628	$ 88,390	$ 1,047,802
Total exposure (1)	$ 1,173,808	$ 396,545	$ 23,934	$ 200,649	$ 117,012	$ 1,911,948	$ 1,055,331	$ 362,545	$ 20,252	$ 206,628	$ 88,390	$ 1,733,146
By geography (9)												
Canada	$ 697,015	$ 284,705	$ 9,444	$ 79,795	$ 41,923	$ 1,112,882	$ 693,700	$ 264,708	$ 9,141	$ 88,523	$ 27,978	$ 1,084,050
U.S.	334,821	79,829	10,145	59,866	24,161	508,822	245,929	69,295	7,866	54,617	27,270	404,977
Europe	79,343	25,485	2,603	39,244	36,107	182,782	62,509	22,667	1,991	42,483	25,757	155,407
Other International	62,629	6,526	1,742	21,744	14,821	107,462	53,193	5,875	1,254	21,005	7,385	88,712
Total exposure (1)	$ 1,173,808	$ 396,545	$ 23,934	$ 200,649	$ 117,012	$ 1,911,948	$ 1,055,331	$ 362,545	$ 20,252	$ 206,628	$ 88,390	$ 1,733,146

(1) Excludes securitization, banking book equities and other assets not subject to the standardized or IRB approach as well as exposures acquired through the U.S. government Paycheck Protection Program.

(2) EAD for standardized exposures are reported net of allowance for impaired assets and EAD for IRB exposures are reported gross of all ACL and partial write-offs as per regulatory definitions.

(3) EAD for undrawn credit commitments and other off-balance sheet amounts are reported after the application of credit conversion factors.

(4) Includes other off-balance sheet exposures such as letters of credit and guarantees.

(5) Counterparty credit risk EAD reflects exposure amounts after netting. Collateral is included in EAD for repo-style transactions to the extent allowed by regulatory guidelines. Exchange traded derivatives are included in Other sectors.

(6) Includes residential mortgages and home equity lines of credit.

(7) Includes credit cards, unsecured lines of credit and overdraft protection products.

(8) Comparative amounts have been reclassified from those previously presented.

(9) Geographic profile is based on country of residence of the borrower.

2022 vs. 2021

Total credit risk exposure increased $179 billion or 10% from last year, primarily due to the impact of foreign exchange translation, volume growth in loans and undrawn commitments in our retail and wholesale portfolios, higher derivative exposures and an increase in securities.

Table of Contents

Net International exposure by region and client type (1), (2) — **Table 44**

(Millions of Canadian dollars)	As at October 31 2022								October 31 2021
	Asset type				Client type				
	Loans Outstanding	Securities (3)	Repo-style transactions	Derivatives	Financials	Sovereign	Corporate	Total	Total
Europe (excluding U.K.)	$ 14,832	$ 38,187	$ 1,408	$ 3,326	$ 18,746	$ 25,896	$ 13,111	$ 57,753	$ 49,893
U.K.	8,332	26,926	597	4,094	17,374	14,198	8,377	39,949	34,075
Caribbean (4)	8,524	10,594	455	115	7,605	3,913	8,170	19,688	20,945
Asia-Pacific	6,817	26,031	941	1,549	11,017	19,392	4,929	35,338	27,871
Other (4), (5)	596	1,990	390	67	574	1,833	636	3,043	2,547
Net International exposure (6), (7)	$ 39,101	$ 103,728	$ 3,791	$ 9,151	$ 55,316	$ 65,232	$ 35,223	$ 155,771	$ 135,331

(1) Geographic profile is based on country of risk, which reflects our assessment of the geographic risk associated with a given exposure. Typically, this is the residence of the borrower.

(2) Exposures are calculated on a fair value basis and net of collateral, which includes $357 billion against repo-style transactions (October 31, 2021 – $349 billion) and $14 billion against derivatives (October 31, 2021 – $11 billion).

(3) Securities include $13 billion of trading securities (October 31, 2021 – $22 billion), $56 billion of deposits (October 31, 2021 – $34 billion), and $35 billion of investment securities (October 31, 2021 – $33 billion).

(4) Exposures to Latin America, previously reported with Caribbean exposures, are now presented in Other. Comparative period amounts have been reclassified to conform to this presentation.

(5) Includes exposures in the Middle East, Africa, and Latin America.

(6) Excludes $5,213 million (October 31, 2021 – $3,076 million) of exposures to supranational agencies.

(7) Reflects $2,233 million of mitigation through credit default swaps, which are largely used to hedge single name exposures and market risk (October 31, 2021 – $1,499 million).

Residential mortgages and home equity lines of credit (insured vs. uninsured) (1)
Residential mortgages and home equity lines of credit are secured by residential properties. The following table presents a breakdown by geographic region.

Residential mortgages and home equity lines of credit — **Table 45**

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2022						
	Residential mortgages						Home equity lines of credit (3)
	Insured (2)		Uninsured		Total		Total
Region (4)							
Canada							
Atlantic provinces	**$ 8,460**	**46%**	**$ 10,052**	**54%**	**$ 18,512**		**$ 1,659**
Quebec	**12,444**	**29**	**30,623**	**71**	**43,067**		**3,300**
Ontario	**31,409**	**17**	**156,700**	**83**	**188,109**		**17,009**
Alberta	**19,663**	**47**	**22,154**	**53**	**41,817**		**4,923**
Saskatchewan and Manitoba	**8,847**	**43**	**11,808**	**57**	**20,655**		**1,940**
B.C. and territories	**12,290**	**17**	**59,347**	**83**	**71,637**		**7,386**
Total Canada (5)	**93,113**	**24**	**290,684**	**76**	**383,797**		**36,217**
U.S.	**–**	**–**	**31,956**	**100**	**31,956**		**1,776**
Other International	**–**	**–**	**3,043**	**100**	**3,043**		**1,621**
Total International	**–**	**–**	**34,999**	**100**	**34,999**		**3,397**
Total	**$ 93,113**	**22%**	**$ 325,683**	**78%**	**$ 418,796**		**$ 39,614**

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2021						
	Residential mortgages						Home equity lines of credit (3)
	Insured (2)		Uninsured		Total		Total
Region (4)							
Canada							
Atlantic provinces	$ 8,407	48%	$ 8,944	52%	$ 17,351		$ 1,602
Quebec	12,742	32	27,567	68	40,309		3,135
Ontario	34,211	20	135,767	80	169,978		15,891
Alberta	20,680	50	20,821	50	41,501		5,343
Saskatchewan and Manitoba	9,179	46	10,714	54	19,893		1,970
B.C. and territories	13,314	20	51,823	80	65,137		7,383
Total Canada (5)	98,533	28	255,636	72	354,169		35,324
U.S.	1	–	23,422	100	23,423		1,413
Other International	–	–	2,740	100	2,740		1,518
Total International	1	–	26,162	100	26,163		2,931
Total	$ 98,534	26%	$ 281,798	74%	$ 380,332		$ 38,255

(1) Disclosure is provided in accordance with the requirements of OSFI's GuidelineB-20 (Residential Mortgage Underwriting Practices and Procedures).
(2) Insured residential mortgages are mortgages whereby our exposure to default is mitigated by insurance through the Canadian Mortgage and Housing Corporation or other private mortgage default insurers.
(3) Includes $39,591 million and $23 million of uninsured and insured home equity lines of credit, respectively (October 31, 2021 – $38,228 million and $27 million, respectively), reported within the personal loan category. The amounts in the U.S. and Other International include term loans collateralized by residential mortgages.
(4) Region is based upon the address of the property mortgaged. The Atlantic provinces are comprised of Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick, and B.C. and territories are comprised of British Columbia, Nunavut, Northwest Territories and Yukon.
(5) Total consolidated residential mortgages in Canada of $384 billion (October 31, 2021 – $354 billion) includes $12 billion (October 31, 2021 – $11 billion) of mortgages with commercial clients in Canadian Banking, of which $9 billion (October 31, 2021 – $8 billion) are insured mortgages, and $17 billion (October 31, 2021 – $19 billion) of residential mortgages in Capital Markets, of which $17 billion (October 31, 2021 – $18 billion) are held for securitization purposes. All of the residential mortgages held for securitization purposes are insured (October 31, 2021 – all insured).

Residential mortgages portfolio by amortization period (1)
The following table provides a summary of the percentage of residential mortgages that fall within the remaining amortization periods based upon current customer payment amounts, which incorporate payments larger than the minimum contractual amount and/or higher frequency of payments.

Residential mortgages portfolio by amortization period — Table 46

	As at					
	October 31 2022			October 31 2021		
	Canada	U.S. and other International	Total	Canada	U.S. and other International	Total
Amortization period						
≤ 25 years	**57%**	**25%**	**54%**	75%	27%	71%
> 25 years ≤ 30 years	**16**	**75**	**21**	25	71	28
> 30 years ≤ 35 years	**2**	**–**	**2**	–	2	1
> 35 years	**25**	**–**	**23**	–	–	–
Total	**100%**	**100%**	**100%**	100%	100%	100%

(1) Disclosure is provided in accordance with the requirements of OSFI's GuidelineB-20 (Residential Mortgage Underwriting Practices and Procedures).

Average LTV ratios (1)
The following table provides a summary of our average LTV ratios for newly originated and acquired uninsured residential mortgages and RBC Homeline Plan® products by geographic region, as well as the respective LTV ratios for our total Canadian Banking residential mortgage portfolio outstanding.

Average LTV ratios — Table 47

	For the year ended			
	October 31 2022		October 31 2021	
	Uninsured		Uninsured	
	Residential mortgages (2)	RBC Homeline Plan® products (3)	Residential mortgages (2)	RBC Homeline Plan® products (3)
Average of newly originated and acquired for the period, by region (4)				
Atlantic provinces	**72%**	**73%**	74%	75%
Quebec	**72**	**72**	72	74
Ontario	**70**	**66**	71	68
Alberta	**73**	**73**	73	72
Saskatchewan and Manitoba	**73**	**75**	74	75
B.C. and territories	**68**	**66**	69	67
U.S.	**75**	**n.m.**	74	n.m.
Other International	**72**	**n.m.**	73	n.m.
Average of newly originated and acquired for the period (5), (6)	**71%**	**68%**	72%	69%
Total Canadian Banking residential mortgages portfolio (7)	**52%**	**46%**	52%	46%

(1) Disclosure is provided in accordance with the requirements of OSFI's GuidelineB-20 (Residential Mortgage Underwriting Practices and Procedures).
(2) Residential mortgages exclude residential mortgages within the RBC Homeline Plan® products.
(3) RBC Homeline Plan® products are comprised of both residential mortgages and home equity lines of credit.
(4) Region is based upon address of the property mortgaged. The Atlantic provinces are comprised of Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick, and B.C. and territories are comprised of British Columbia, Nunavut, Northwest Territories and Yukon.
(5) The average LTV ratio for newly originated and acquired uninsured residential mortgages and RBC Homeline Plan® products is calculated on a weighted basis by mortgage amounts at origination.
(6) For newly originated mortgages and RBC Homeline Plan® products, LTV is calculated based on the total facility amount for the residential mortgage and RBC Homeline Plan® product divided by the value of the related residential property.
(7) Weighted by mortgage balances and adjusted for property values based on the Teranet – National Bank National Composite House Price Index.
n.m. not meaningful

Credit quality performance
The following credit quality performance tables and analysis provide information on loans, which represents loans, acceptances and commitments, and other financial assets.

Gross impaired loans (GIL) — Table 48

(Millions of Canadian dollars, except percentage amounts)	As at and for the year ended October 31 2022	October 31 2021
Personal & Commercial Banking	**$ 1,362**	$ 1,590
Wealth Management	**278**	233
Capital Markets	**559**	485
Total GIL	**$ 2,199**	$ 2,308
Impaired loans, beginning balance	**$ 2,308**	$ 3,195
Classified as impaired during the period (new impaired) (1)	**1,711**	1,726
Net repayments (1)	**(450)**	(721)
Amounts written off	**(1,149)**	(1,169)
Other (2)	**(221)**	(723)
Impaired loans, balance at end of period	**$ 2,199**	$ 2,308
GIL as a % of related loans and acceptances		
Total GIL as a % of related loans and acceptances	**0.26%**	0.31%
Personal & Commercial Banking	**0.23%**	0.30%
Canadian Banking	**0.18%**	0.24%
Caribbean Banking	**3.93%**	4.65%
Wealth Management	**0.25%**	0.26%
Capital Markets	**0.42%**	0.45%

(1) Certain GIL movements for Canadian Banking retail and wholesale portfolios are generally allocated to new impaired, as Net repayments and certain Other movements are not reasonably determinable. Certain GIL movements for Caribbean Banking retail and wholesale portfolios are generally allocated to Net repayments and new impaired, as Net repayments and certain Other movements are not reasonably determinable.
(2) Includes return to performing status during the period, recoveries of loans and advances previously written off, sold, and foreign exchange translation and other movements.

2022 vs. 2021
Total GIL of $2,199 million decreased $109 million or 5% from last year and the total GIL ratio of 26 bps decreased 5 bps, due to lower impaired loans in Personal & Commercial Banking, partially offset by higher impaired loans in Capital Markets and Wealth Management.

GIL in Personal & Commercial Banking decreased $228 million or 14%, mainly due to lower impaired loans in our Canadian Banking commercial portfolios, largely in the real estate and related and other services sectors. Lower impaired loans in our Canadian Banking residential mortgages portfolios also contributed to the decrease.

GIL in Wealth Management increased $45 million or 19%, largely due to higher impaired loans in U.S. Wealth Management (including City National), mainly in the consumer discretionary sector, partially offset by repayments in International Wealth Management in the investment sector.

GIL in Capital Markets increased $74 million or 15%, largely due to higher impaired loans in the real estate and related and consumer staples sectors, partially offset by lower impaired loans in a few sectors, including the transportation sector.

Allowance for credit losses — Table 49

(Millions of Canadian dollars)	As at October 31 2022	October 31 2021
Personal & Commercial Banking	**$ 3,200**	$ 3,478
Wealth Management	**382**	320
Capital Markets	**597**	620
Corporate Support and other (1)	**2**	1
ACL on loans	**4,181**	4,419
ACL on other financial assets (2)	**33**	52
Total ACL	**$ 4,214**	$ 4,471
ACL on loans is comprised of:		
Retail	**$ 2,285**	$ 2,287
Wholesale	**1,227**	1,435
ACL on performing loans	**$ 3,512**	$ 3,722
ACL on impaired loans	**669**	697

(1) Includes PCL recorded in Corporate Support, Insurance and Investor & Treasury Services.
(2) ACL on other financial assets mainly represents allowances on debt securities measured at FVOCI and amortized cost, accounts receivable and financial guarantees.

2022 vs. 2021
Total ACL of $4,214 million decreased $257 million or 6% from last year, primarily reflecting a decrease of $238 million in ACL on loans.

ACL on performing loans of $3,512 million decreased $210 million or 6%, primarily due to lower ACL in Personal & Commercial Banking, reflecting the recovery from the COVID-19 pandemic, partially offset by unfavourable changes in our macroeconomic outlook in the current year.

ACL on impaired loans of $669 million decreased $28 million or 4%, due to lower ACL in Capital Markets and Personal & Commercial Banking, partially offset by higher ACL in Wealth Management.

Market risk

Market risk is defined to be the impact of market prices upon our financial condition. This includes potential gains or losses due to changes in market determined variables such as interest rates, credit spreads, equity prices, commodity prices, foreign exchange rates and implied volatilities.

The measures of financial condition impacted by market risk are as follows:

1. Positions whose revaluation gains and losses are reported in revenue, which includes:
   a) Changes in the fair value of instruments classified or designated as FVTPL, and
   b) Hedge ineffectiveness.
2. CET1 capital, which includes:
   a) All of the above, plus
   b) Changes in the fair value of FVOCI securities where revaluation gains and losses are reported as OCI,
   c) Changes in the Canadian dollar value of investments in foreign subsidiaries, net of hedges, due to foreign exchange translation, and
   d) Changes in the fair value of employee benefit plan deficits.
3. CET1 ratio, which includes:
   a) All of the above, plus
   b) Changes in RWA resulting from changes in traded market risk factors, and
   c) Changes in the Canadian dollar value of RWA due to foreign exchange translation.
4. The economic value of the Bank, which includes:
   a) Points 1 and 2 above, plus
   b) Changes in the economic value of other non-trading positions, net interest income, and fee based income, as a result of changes in market risk factors.

Market risk controls – FVTPL positions

As an element of the ERAF, the Board approves our overall market risk constraints. GRM creates and manages the control structure for FVTPL positions which ensures that business is conducted on a basis consistent with Board requirements. The Market and Counterparty Credit Risk function within GRM is responsible for creating and managing the controls and governance procedures that ensure that risk taken is consistent with risk appetite constraints set by the Board. These controls include limits on probabilistic measures of potential loss such as Value-at-Risk, Stressed Value-at-Risk, Incremental Risk Charge and stress tests as defined below:

Value-at-Risk (VaR) is a statistical measure of potential loss for a financial portfolio computed at a given level of confidence and over a defined holding period. We measure VaR at the 99th percentile confidence level for price movements over a one-day holding period using historic simulation of the last two years of equally weighted historic market data. These calculations are updated daily with current risk positions, with the exception of certain less material positions that are not actively traded and are updated on at least a monthly basis.

Stressed Value-at-Risk (SVaR) is calculated in an identical manner as VaR with the exception that it is computed using a fixed historicalone-year period of extreme volatility and its inverse rather than the most recent two-year history. The stress period used is a one-year period covering the market volatility observed during Q2 2020. SVaR is calculated daily for all portfolios, with the exception of certain less material positions that are not actively traded and are updated on at least a monthly basis.

VaR and SVaR are statistical estimates based on historical market data and should be interpreted with knowledge of their limitations, which include the following:

- VaR and SVaR will not be predictive of future losses if the realized market movements differ significantly from the historical periods used to compute them.
- VaR and SVaR project potential losses over a one-day holding period and do not project potential losses for risk positions held over longer time periods.
- VaR and SVaR are measured using positions at close of business and do not include the impact of trading and hedging activity over the course of a day.

We validate our VaR and SVaR measures through a variety of means – including subjecting the models to vetting and validation by a group independent of the model developers and by back-testing the VaR against daily marked-to-market revenue to identify and examine events in which actual outcomes in trading revenue exceed the VaR projections.

Incremental Risk Charge (IRC) captures the risk of losses under default or rating changes for issuers of certain traded fixed income instruments. IRC is measured over a one year horizon at a 99.9% confidence level, and captures different liquidity horizons for instruments and concentrations in issuers under a constant level of risk assumption. Changes in measured risk levels are primarily associated with changes in inventory from the applicable fixed income trading portfolios.

Stress tests – Our market risk stress testing program is used to identify and control risk due to large changes in market prices and rates. We conduct stress testing daily on positions that are marked-to-market. The stress tests simulate both historical and hypothetical events which are severe and long-term in duration. Historical scenarios are taken from actual market events and range in duration up to 90 days. Examples include the COVID-19 Pandemic of 2020, Global Financial Crisis of 2008 and the Taper Tantrum of 2013. Hypothetical scenarios are designed to be forward-looking at potential future market stresses, and are designed to be severe but plausible. We are constantly evaluating and refining these scenarios as market conditions change. Stress results are calculated assuming an instantaneous revaluation of our positions with no management action.

These measures are computed on all positions that are FVTPL for financial reporting purposes, with the exception of those in a designated hedging relationship and those in our insurance businesses.

Market risk measures – FVTPL positions

Market risk measures* **Table 50**

	October 31, 2022				October 31, 2021			
		For the year ended				For the year ended		
(Millions of Canadian dollars)	As at	Average	High	Low	As at	Average	High	Low
Equity	$ 45	$ 34	$ 51	$ 21	$ 24	$ 20	$ 38	$ 12
Foreign exchange	3	4	7	1	4	4	6	2
Commodities	6	5	6	3	3	3	4	2
Interest rate (1)	47	34	62	17	61	44	64	21
Credit specific (2)	5	7	10	4	9	8	11	6
Diversification (3)	(47)	(31)	n.m.	n.m.	(51)	(35)	n.m.	n.m.
Market risk VaR (4)	$ 59	$ 53	$ 87	$ 34	$ 50	$ 44	$ 72	$ 23
Market risk Stressed VaR (4)	$ 192	$ 103	$ 226	$ 47	$ 59	$ 53	$ 101	$ 29

* This table represents an integral part of our 2022 Annual Consolidated Financial Statements.

(1) General credit spread risk and funding spread risk associated with uncollateralized derivatives are included under interest rate VaR.

(2) Credit specific risk captures issuer-specific credit spread volatility.

(3) Market risk VaR is less than the sum of the individual risk factor VaR results due to risk factor diversification.

(4) The average market risk VaR and average SVaR for the year ended October 31, 2022 includes $1 million and $36 million, respectively (October 31, 2021 – $3 million and $15 million), related to loan underwriting commitments.

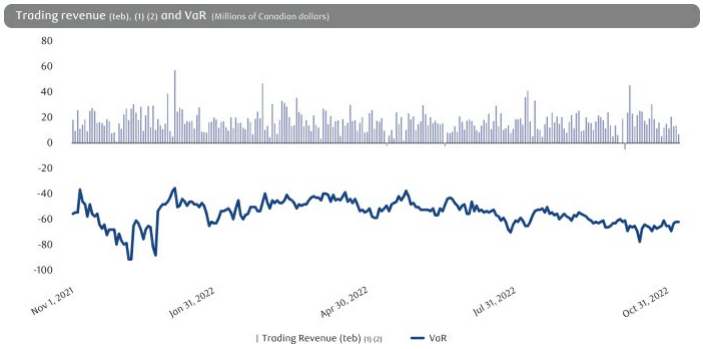
n.m. not meaningful

2022 vs. 2021

Average market risk VaR of $53 million increased $9 million from last year. This was driven by the impact of heightened market volatility this year on our equity derivatives portfolio, partially offset by the impact of the Q2 2020 period of significant market volatility no longer being reflected in our two-year historical VaR period.

Average SVaR of $103 million increased $50 million, largely driven by unfavourable market conditions this year which impacted loan underwriting commitments, and increased exposures in our fixed income portfolios.

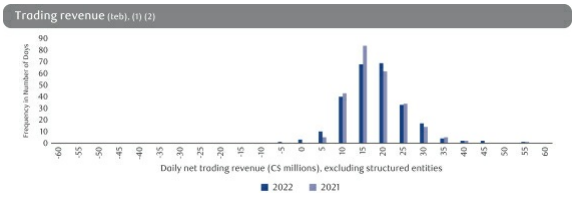
The following chart displays a bar graph of our daily trading profit and loss and a line graph of our daily market risk VaR. We incurred 4 days of net trading losses in 2022.



(1) Trading revenue (teb) amounts in the chart above have been revised from those previously presented.

(2) Trading revenue (teb) amounts in the chart above exclude the impact of loan underwriting commitments.

The following chart displays the distribution of daily trading profit and loss in 2022 and 2021 with 4 days of net trading losses in 2022 as mentioned above and no net trading losses in 2021. The largest reported profit was $54 million with an average daily profit of $16 million.



(1) Amounts have been revised from those previously presented.
(2) Trading revenue (teb) amounts in the chart above exclude the impact of loan underwriting commitments.

Market risk measures for assets and liabilities of RBC Insurance[8]
We offer a range of insurance products to clients and hold investments to meet the future obligations to policyholders. The investments which support actuarial liabilities are predominantly fixed income assets designated as FVTPL. Consequently, changes in the fair values of these assets are recorded in the Consolidated Statements of Income and are largely offset by changes in the fair value of the actuarial liabilities, the impact of which is reflected in PBCAE. As at October 31, 2022, we held assets in support of approximately $12 billion of liabilities with respect to insurance obligations (October 31, 2021 – $13 billion).

Market risk controls – Interest Rate Risk in the Banking Book (IRRBB) positions[1]
IRRBB arises primarily from traditional customer-originated banking products such as deposits and loans, and includes related hedges and interest rate risk from securities held for liquidity management purposes. Factors contributing to IRRBB include mismatches between asset and liability repricing dates, relative changes in asset and liability rates in response to market rate scenarios, and other product features affecting the expected timing of cash flows, such as options to pre-pay loans or redeem term deposits prior to contractual maturity. IRRBB sensitivities are regularly measured and reported, and subject to limits and controls with independent oversight from GRM.

The Board approves the risk appetite for IRRBB, and the Asset-Liability Committee (ALCO) and GRM provide ongoing governance through IRRBB risk policies, limits, operating standards and other controls. IRRBB reports are reviewed regularly by GRM, ALCO, the GRC, the Risk Committee of the Board and the Board.

IRRBB measurement
To monitor and control IRRBB, we assess two primary metrics, Net Interest Income (NII) risk and Economic Value of Equity (EVE) risk, under a range of market shocks, scenarios, and time horizons. Market scenarios include currency-specific parallel and non-parallel yield curve changes, interest rate volatility shocks, and interest rate scenarios prescribed by regulators.

In measuring NII risk, detailed banking book balance sheets and income statements are dynamically simulated to estimate the impact of market stress scenarios on projected NII. Assets, liabilities and off-balance sheet positions are simulated over various time horizons. The simulations incorporate maturities, renewals, and new originations along with prepayment and redemption behaviour. Product pricing and volumes are forecasted based on past experience to determine response expectations for a given market shock scenario. EVE risk captures the market value sensitivity to changes in rates. In measuring EVE risk, deterministic (single-scenario) and stochastic (multiple-scenario) valuation techniques are applied to spot position data. NII and EVE risks are measured for a range of market risk stress scenarios which include extreme but plausible changes in market rates and volatilities. IRRBB measures assume continuation of existing hedge strategies.

Management of NII and EVE risk is complementary and supports our efforts to generate a sustainable high-quality NII stream. NII and EVE risks for specific units are measured daily, weekly or monthly depending on materiality, complexity and hedge strategy.

A number of assumptions affecting cash flows, product re-pricing and the administration of rates underlie the models used to measure NII and EVE risk. The key assumptions pertain to the projected funding date of mortgage rate commitments, fixed-rate loan prepayment behaviour, term deposit redemption behaviour, and the term and rate profile of non-maturity deposits. All assumptions are derived empirically based on historical client behaviour and product pricing with consideration of possible forward-looking changes. All models and assumptions used to measure IRRBB are subject to independent oversight by GRM.

Market risk measures – IRRBB Sensitivities
The following table shows the potential before-tax impact of an immediate and sustained 100 bps increase or decrease in interest rates on projected 12-month NII and EVE, assuming no subsequent hedging. Rate floors are applied within the declining rate scenarios to prevent EVE valuation and NII simulation market rate levels from falling below a minimum average level of negative 25 bps across major currencies. Interest rate risk measures are based on current on and off-balance sheet positions which can change over time in response to business activity and management actions.

1 IRRBB positions include the impact of derivatives in hedge accounting relationships and FVOCI securities used for interest rate risk management.

Market risk – IRRBB measures* **Table 51**

(Millions of Canadian dollars)	October 31 2022 EVE risk Canadian dollar impact	EVE risk U.S. dollar impact	EVE risk Total	NII risk (1) Canadian dollar impact	NII risk (1) U.S. dollar impact	NII risk (1) Total	October 31 2021 EVE risk	NII risk (1)
Before-tax impact of:								
100 bps increase in rates	**$ (1,332)**	**$ (568)**	**$ (1,900)**	**$ 547**	**$ 234**	**$ 781**	$ (2,009)	$ 929
100 bps decrease in rates	**1,269**	**440**	**1,709**	**(598)**	**(241)**	**(839)**	1,537	(921)

* This table represents an integral part of our 2022 Annual Consolidated Financial Statements.

(1) Represents the 12-month NII exposure to an instantaneous and sustained shift in interest rates.

As at October 31, 2022, an immediate and sustained -100 bps shock would have had a negative impact to our NII of $839 million, down from $921 million last year, and an immediate and sustained +100 bps shock would have had a negative impact to our EVE of $1,900 million, down from $2,009 million last year. Both the year-over-year change in NII and EVE sensitivity reflect additional hedging activity. The impact of hedging activity on the EVE sensitivity was more than offset by the impact of a higher rate environment. During 2022, NII and EVE risks remained within approved limits.

Market risk measures for other material non-trading portfolios

Investment securities carried at FVOCI

We held $93 billion of investment securities carried at FVOCI as at October 31, 2022, compared to $78 billion at the end of the prior year. We hold debt securities carried at FVOCI primarily as investments, as well as to manage liquidity risk and hedge interest rate risk in our non-trading banking balance sheet. As at October 31, 2022, our portfolio of investment securities carried at FVOCI is interest rate sensitive and would impact OCI by a pre-tax change in value of $6 million as measured by the change in the value of the securities for a one basis point parallel increase in yields. The portfolio also exposes us to credit spread risk of a pre-tax change in value of $16 million, as measured by the change in value for a one basis point widening of credit spreads. The value of the investment securities carried at FVOCI included in our IRRBB measures as at October 31, 2022 was $90 billion. Our investment securities carried at FVOCI also include equity exposures of $1 billion as at October 31, 2022, compared to $1 billion at the end of the prior year.

Non-trading foreign exchange rate risk

Foreign exchange rate risk is the potential adverse impact on earnings and economic value due to changes in foreign currency rates. Our revenue, expenses and income denominated in currencies other than the Canadian dollar are subject to fluctuations as a result of changes in the value of the average Canadian dollar relative to the average value of those currencies. Our most significant exposure is to the U.S. dollar, due to our operations in the U.S. and other activities conducted in U.S. dollars. Other significant exposures are to the British pound and the Euro, due to our activities conducted internationally in these currencies. A strengthening or weakening of the Canadian dollar compared to the U.S. dollar, British pound and the Euro could reduce or increase, as applicable, the translated value of our foreign currency denominated revenue, expenses and earnings and could have a significant effect on the results of our operations. We are also exposed to foreign exchange rate risk arising from our investments in foreign operations. For unhedged equity investments, when the Canadian dollar appreciates against other currencies, the unrealized translation losses on net foreign investments decreases our shareholders' equity through the other components of equity and decreases the translated value of the RWA of the foreign currency-denominated asset. The reverse is true when the Canadian dollar depreciates against other currencies. Consequently, we consider these impacts in selecting an appropriate level of our investments in foreign operations to be hedged.

Derivatives related to non-trading activity

Derivatives are also used to hedge market risk exposure unrelated to our trading activity. Hedge accounting is elected where applicable. These derivatives are included in our IRRBB measures and other internal non-trading market risk measures. We use interest rate swaps to manage our IRRBB, funding and investment activities. Interest rate swaps are also used to hedge changes in the fair value of certain fixed-rate instruments. We also use foreign exchange derivatives to manage our exposure to equity investments in subsidiaries that are denominated in foreign currencies, particularly the U.S. dollar, British Pound, and Euro.

For further details on the application of hedge accounting and the use of derivatives for hedging activities, refer to Notes 2 and 9 of our 2022 Annual Consolidated Financial Statements.

Linkage of market risk to selected balance sheet items

The following tables provide the linkages between selected balance sheet items with positions included in our trading market risk and non-trading market risk disclosures, which illustrates how we manage market risk for our assets and liabilities through different risk measures:

Linkage of market risk to selected balance sheet items — Table 52

	As at October 31, 2022			
		Market risk measure		
(Millions of Canadian dollars)	Balance sheet amount	Traded risk (1)	Non-traded risk (2)	Non-traded risk primary risk sensitivity
Assets subject to market risk				
Cash and due from banks	$ 72,397	$ –	$ 72,397	Interest rate
Interest-bearing deposits with banks	108,011	84,468	23,543	Interest rate
Securities				
Trading	148,205	137,293	10,912	Interest rate, credit spread
Investment, net of applicable allowance	170,018	–	170,018	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed	317,845	264,665	53,180	Interest rate
Loans				
Retail	549,751	6,128	543,623	Interest rate
Wholesale	273,967	8,558	265,409	Interest rate
Allowance for loan losses	(3,753)	–	(3,753)	Interest rate
Segregated fund net assets	2,638	–	2,638	Interest rate
Other				
Derivatives	154,439	151,244	3,195	Interest rate, foreign exchange
Other assets	109,629	8,826	100,803	Interest rate
Assets not subject to market risk (3)	14,072			
Total assets	$ 1,917,219	$ 661,182	$ 1,241,965	
Liabilities subject to market risk				
Deposits	$ 1,208,814	$ 141,319	$ 1,067,495	Interest rate
Segregated fund liabilities	2,638	–	2,638	Interest rate
Other				
Obligations related to securities sold short	35,511	35,511	–	
Obligations related to assets sold under repurchase agreements and securities loaned	273,947	248,712	25,235	Interest rate
Derivatives	153,491	139,406	14,085	Interest rate, foreign exchange
Other liabilities	102,881	10,594	92,287	Interest rate
Subordinated debentures	10,025	–	10,025	Interest rate
Liabilities not subject to market risk (4)	21,737			
Total liabilities	$ 1,809,044	$ 575,542	$ 1,211,765	
Total equity	108,175			
Total liabilities and equity	$ 1,917,219			

(1) Traded risk includes positions that are classified or designated as FVTPL and positions whose revaluation gains and losses are reported in revenue. Market risk measures of VaR, SVaR, IRC and stress tests are used as risk controls for traded risk.
(2) Non-traded risk includes positions used in the management of IRRBB and other non-trading portfolios. Other material non-trading portfolios include positions from RBC Insurance® and investment securities, net of applicable allowance, not included in IRRBB.
(3) Assets not subject to market risk include physical and other assets.
(4) Liabilities not subject to market risk include payroll related and other liabilities.

Table of Contents

(Millions of Canadian dollars)	Balance sheet amount	Market risk measure: Traded risk (1)	Market risk measure: Non-traded risk (2)	Non-traded risk primary risk sensitivity
	As at October 31, 2021			
Assets subject to market risk				
Cash and due from banks	$ 113,846	$ –	$ 113,846	Interest rate
Interest-bearing deposits with banks	79,638	56,896	22,742	Interest rate
Securities				
Trading	139,240	127,259	11,981	Interest rate, credit spread
Investment, net of applicable allowance	145,484	–	145,484	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed	307,903	265,011	42,892	Interest rate
Loans				
Retail	503,598	9,231	494,367	Interest rate
Wholesale	218,066	9,685	208,381	Interest rate
Allowance for loan losses	(4,089)	–	(4,089)	Interest rate
Segregated fund net assets	2,666	–	2,666	Interest rate
Other				
Derivatives	95,541	92,829	2,712	Interest rate, foreign exchange
Other assets	92,157	8,615	83,542	Interest rate
Assets not subject to market risk (3)	12,273			
Total assets	$ 1,706,323	$ 569,526	$ 1,124,524	
Liabilities subject to market risk				
Deposits	$ 1,100,831	$ 136,927	$ 963,904	Interest rate
Segregated fund liabilities	2,666	–	2,666	Interest rate
Other				
Obligations related to securities sold short	37,841	37,841	–	
Obligations related to assets sold under repurchase agreements and securities loaned	262,201	236,146	26,055	Interest rate
Derivatives	91,439	89,290	2,149	Interest rate, foreign exchange
Other liabilities	87,084	8,528	78,556	Interest rate
Subordinated debentures	9,593	–	9,593	Interest rate
Liabilities not subject to market risk (4)	15,906			
Total liabilities	$ 1,607,561	$ 508,732	$ 1,082,923	
Total equity	98,762			
Total liabilities and equity	$ 1,706,323			

(1) Traded risk includes positions that are classified or designated as FVTPL and positions whose revaluation gains and losses are reported in revenue. Market risk measures of VaR, SVaR, IRC and stress tests are used as risk controls for traded risk.
(2) Non-traded risk includes positions used in the management of IRRBB and other non-trading portfolios. Other material non-trading portfolios include positions from RBC Insurance® and investment securities, net of applicable allowance, not included in IRRBB.
(3) Assets not subject to market risk include physical and other assets.
(4) Liabilities not subject to market risk include payroll related and other liabilities.

Liquidity and funding risk

Liquidity and funding risk (liquidity risk) is the risk that we may be unable to generate sufficient cash or its equivalents in a timely and cost-effective manner to meet our commitments. Liquidity risk arises from mismatches in the timing and value of on-balance sheet and off-balance sheet cash flows.

Our liquidity profile is structured to ensure that we have sufficient liquidity to satisfy current and prospective commitments in both normal and stressed conditions. To achieve this goal, we operate under a comprehensive Liquidity Risk Management Framework (LRMF) and Pledging Policy. We also employ several liquidity risk mitigation strategies that include:

- Achieving an appropriate balance between the level of exposure allowed under our risk appetite and the cost of risk mitigation;
- Maintaining broad funding access, including preserving and promoting a reliable base of core client deposits and ongoing access to diversified wholesale funding sources;
- A comprehensive liquidity stress testing program, contingency, recovery and resolution planning and status monitoring to ensure sufficiency of unencumbered marketable securities and demonstrated capacity to monetize specific asset classes;
- Governance of pledging activity through limits and liquid asset buffers for potential pledging activity;
- Timely and granular risk measurement information;
- Transparent liquidity transfer pricing and cost allocation; and
- Our three lines of defense governance model.

Risk control

Our liquidity risk objectives, policies, models and methodologies are reviewed regularly, and are updated to reflect changing market conditions and business mix. This includes aligning with local regulatory developments. We continue to maintain liquidity and funding that is appropriate for the execution of our strategy. Liquidity risk remains well within our risk appetite.

The Board annually approves the enterprise liquidity risk appetite recommended by the Risk Committee of the Board. The Risk Committee of the Board reviews and recommends the liquidity risk appetite and approves the LRMF. The Board, the Risk Committee of the Board, the GRC and the ALCO regularly review reporting on our consolidated liquidity position. The GRC, the Policy Review Committee (PRC) and/or the ALCO also review liquidity documents prepared for the Board or its committees.

- The PRC approves the Liquidity Risk Policy, which establishes minimum risk control elements in accordance with the Board-approved risk appetite and the LRMF, and the Pledging Policy, which outlines the requirements and authorities for the management of our pledging activities.
- The ALCO annually approves the Enterprise Liquidity Contingency Plan (ELCP) and provides strategic direction and oversight to Corporate Treasury, other functions, and business segments on the management of liquidity.

These policies are supported by operational, desk and product-level policies that implement risk control elements, such as parameters, methodologies, management limits and authorities that govern the measurement and management of liquidity. Stress testing is also employed to assess the robustness of the control framework and inform liquidity contingency plans.

Risk measurement

Liquidity risk is measured by applying scenario-specific assumptions against our assets and liabilities and off-balance sheet commitments to derive expected cash flow profiles over varying time horizons. For example, government bonds generally can be quickly and easily converted to cash without significant loss of value regardless of their contractual maturity. Similarly, while relationship-based deposits contractually can be withdrawn immediately, in practice, these balances can be relatively stable sources of funding depending on several factors, such as the nature of the client and their intended use. Risk methodologies and underlying assumptions are periodically reviewed and validated to ensure their alignment with our operating environment, expected economic and market conditions, rating agency preferences, regulatory requirements and generally accepted industry practices.

To manage liquidity risk within our liquidity risk appetite, we set limits on various metrics reflecting a range of time horizons and severity of stress conditions and develop contingency, recovery and resolution plans. Our liquidity risk measurement and control activities are divided into three categories as follows:

Structural (longer-term) liquidity risk

To guide our secured and unsecured wholesale term funding activities, we employ both internal and regulatory metrics to manage and control the structural alignment between long-term illiquid assets and longer-term funding sourced from wholesale investors and core relationship deposits.

Tactical (shorter-term) liquidity risk

To address potential immediate cash flow risks in times of stress, we use short-term net cash flow limits to control risk of material units, subsidiaries and currencies, and perform stress testing assessments. Net cash flow positions are determined by applying internally-derived risk assumptions and parameters to known and anticipated cash flows for all material unencumbered assets, liabilities and off-balance sheet activities. Encumbered assets are not considered a source of available liquidity. We also control tactical liquidity by adhering to relevant regulatory standards, such as LCR.

Contingency liquidity risk

Contingency liquidity risk planning assesses the impact of sudden stress events and our planned responses. Our ELCP, maintained and administered by Corporate Treasury, has been developed to guide our potential responses to liquidity crises. Under leadership of Corporate Treasury, both enterprise and regional Liquidity Crisis Teams (LCT) meet regularly to assess our liquidity status, approve the ELCP, and in times of stress provide valuable linkages to front line and risk functions to support the crisis management process. LCT's include members from key business segments, GRM, Finance, Operations, and Communications with relevant subject matter expertise.

Our stress tests, which include elements of scenario and sensitivity analyses, measure our prospective exposure to systemic and RBC-specific events over a period of several weeks. Different levels of severity are considered for each type of crisis with some scenarios reflecting multiple-downgrades to our credit ratings.

The contingency liquidity risk planning process identifies contingent funding needs (e.g., draws on committed credit and liquidity lines, demands for more collateral and deposit run-off) and sources (e.g., contingent liquid asset sales and incremental wholesale funding capacity) under various stress scenarios, and as a result, informs requirements for our earmarked unencumbered liquid asset portfolios.

Our unencumbered liquid asset portfolios consist of diversified, highly rated and liquid marketable securities, overnight government reverse repos and deposits with central banks. These portfolios are subject to minimum asset quality levels and, as appropriate, other eligibility guidelines (e.g., maturity, diversification and eligibility for central bank advances) to maximize ready access to additional cash should it be required. These securities, when added to other unencumbered liquid assets that we hold as a result of capital markets or other activities, contribute to our liquidity reserve, and are reflected in the asset encumbrance disclosures shown below.

Liquidity reserve and asset encumbrance

The following tables provide summaries of our liquidity reserve and asset encumbrance. In both tables, unencumbered assets represent, to varying degrees, a ready source of funding. Unencumbered assets are the difference between total and encumbered assets from both on- and off-balance sheet sources. The encumbered assets include: (i) bank-owned liquid assets that are either pledged as collateral (e.g., repo financing and derivative pledging) or not freely available due to regulatory or internal policy requirements (e.g., earmarked to satisfy mandatory reserve or regional capital adequacy requirements and to maintain continuous access to payment and settlement systems); (ii) securities received as collateral from securities financing and derivative transactions which have either been re-hypothecated where permissible (e.g., to obtain financing through repos or to cover securities sold short) or have no liquidity value since re-hypothecation is prohibited; and (iii) illiquid assets that have been securitized and sold into the market or that have been pledged as collateral in support of structured term funding vehicles. As per our liquidity management framework and practice, encumbered assets are not considered a source of liquidity.

Liquidity reserve

Our liquidity reserve consists of available unencumbered liquid assets. Although unused wholesale funding capacity, which is regularly assessed, could be another potential source of liquidity to mitigate stressed conditions, it is excluded in the determination of the liquidity reserve. Similarly, uncommitted and undrawn central bank borrowing facilities that could be accessed subject to satisfying certain preconditions as set by various central banks (e.g., BoC, the Fed, Bank of England, and Bank of France), as well as amounts that qualify as eligible collateral at the Federal Reserve Bank of New York (FRBNY) and Federal Home Loan Bank (FHLB) are also excluded from the determination of the liquidity reserve.

Liquidity reserve — **Table 53**

	As at October 31, 2022				
(Millions of Canadian dollars)	Bank-owned liquid assets	Securities received as collateral from securities financing and derivative transactions	Total liquid assets	Encumbered liquid assets	Unencumbered liquid assets
Cash and deposits with banks	$ 180,408	$ –	$ 180,408	$ 3,601	$ 176,807
Securities issued or guaranteed by sovereigns, central banks or multilateral development banks (1)	246,916	326,089	573,005	373,893	199,112
Other securities	110,057	119,129	229,186	135,349	93,837
Other liquid assets (2)	42,090	–	42,090	40,318	1,772
Total liquid assets	$ 579,471	$ 445,218	$ 1,024,689	$ 553,161	$ 471,528

	As at October 31, 2021				
(Millions of Canadian dollars)	Bank-owned liquid assets	Securities received as collateral from securities financing and derivative transactions	Total liquid assets	Encumbered liquid assets	Unencumbered liquid assets
Cash and deposits with banks	$ 193,484	$ –	$ 193,484	$ 3,405	$ 190,079
Securities issued or guaranteed by sovereigns, central banks or multilateral development banks (1)	214,326	313,732	528,058	357,927	170,131
Other securities	114,692	115,396	230,088	132,360	97,728
Other liquid assets (2)	27,600	–	27,600	25,981	1,619
Total liquid assets	$ 550,102	$ 429,128	$ 979,230	$ 519,673	$ 459,557

	As at	
(Millions of Canadian dollars)	October 31 2022	October 31 2021
Royal Bank of Canada	$ 186,855	$ 233,342
Foreign branches	90,910	68,567
Subsidiaries	193,763	157,648
Total unencumbered liquid assets	$ 471,528	$ 459,557

(1) Includes liquid securities issued by provincial governments and U.S. government-sponsored entities working under U.S. Federal government's conservatorship (e.g., Federal National Mortgage Association and Federal Home Loan Mortgage Corporation).

(2) Encumbered liquid assets amount represents cash collateral and margin deposit amounts pledged related to OTC and exchange-traded derivative transactions.

The liquidity reserve is typically most affected by routine flows of client banking activity where liquid asset portfolios reflect changes in deposit and loan balances, as well as by activities in Capital Markets and Investor & Treasury Services, where business strategies and client flows may also affect liquidity reserve balances. Corporate Treasury also affects liquidity reserves through the management of funding issuances where reserves absorb timing mismatches between debt issuances and deployment into business activities.

2022 vs. 2021
Total unencumbered liquid assets increased $12 billion or 3% from last year, mainly due to an increase in on-balance sheet securities reflecting higher wholesale funding and client deposit levels.

Asset encumbrance
The table below provides a summary of our on- and off-balance sheet amounts for cash, securities and other assets, distinguishing between those that are encumbered or available for sale or use as collateral in secured funding transactions. Other assets, such as mortgages and credit card receivables, can also be monetized, albeit over longer timeframes than those required for marketable securities. As at October 31, 2022, our unencumbered assets available as collateral comprised 24% of total assets (October 31, 2021 – 26%).

Asset encumbrance — **Table 54**

	As at									
	October 31 2022					October 31 2021				
	Encumbered		Unencumbered			Encumbered		Unencumbered		
(Millions of Canadian dollars)	Pledged as collateral	Other (1)	Available as collateral (2)	Other (3)	Total	Pledged as collateral	Other (1)	Available as collateral (2)	Other (3)	Total
Cash and deposits with banks	$ –	$ 3,601	$ 176,807	$ –	$ 180,408	$ –	$ 3,405	$ 190,079	$ –	$ 193,484
Securities										
Trading	62,941	–	91,738	3,303	157,982	56,602	–	87,311	3,633	147,546
Investment, net of applicable allowance	7,996	–	162,022	–	170,018	12,055	–	133,429	–	145,484
Assets purchased under reverse repurchase agreements and securities borrowed (4)	456,292	21,709	9,192	3,409	490,602	437,408	18,310	17,436	5,343	478,497
Loans										
Retail										
Mortgage securities	28,208	–	27,263	–	55,471	29,370	–	30,778	–	60,148
Mortgage loans	62,905	–	26,696	273,724	363,325	46,699	–	29,858	243,627	320,184
Non-mortgage loans	6,066	–	–	124,889	130,955	3,213	–	8,110	111,943	123,266
Wholesale	–	–	9,119	264,848	273,967	–	–	–	218,066	218,066
Allowance for loan losses	–	–	–	(3,753)	(3,753)	–	–	–	(4,089)	(4,089)
Segregated fund net assets	–	–	–	2,638	2,638	–	–	–	2,666	2,666
Other										
Derivatives	–	–	–	154,439	154,439	–	–	–	95,541	95,541
Others (5)	40,318	–	1,772	81,611	123,701	25,981	–	1,619	76,830	104,430
Total assets	$ 664,726	$ 25,310	$ 504,609	$ 905,108	$ 2,099,753	$ 611,328	$ 21,715	$ 498,620	$ 753,560	$1,885,223

(1) Includes assets restricted from use to generate secured funding due to legal or other constraints.
(2) Represents assets that are readily available for use as collateral, including NHA MBS, our unencumbered mortgage loans that qualify as eligible collateral at FHLB, as well as loans that qualify as eligible collateral for discount window facility available to us and lodged at the FRBNY.
(3) Other unencumbered assets are not subject to any restrictions on their use to secure funding or as collateral but would not be considered readily available.
(4) Includes bank-owned liquid assets and securities received as collateral fromoff-balance sheet securities financing, derivative transactions, and margin lending. Includes $22 billion (October 31, 2021 – $18 billion) of collateral received through reverse repurchase transactions that cannot be rehypothecated in its current legal form.
(5) The Pledged as collateral amount represents cash collateral and margin deposit amounts pledged related to OTC and exchange-traded derivative transactions.

Funding

Funding strategy
Core funding, comprising capital, longer-term wholesale liabilities and a diversified pool of personal and, to a lesser extent, commercial and institutional deposits, is the foundation of our structural liquidity position.

Deposit and funding profile
As at October 31, 2022, relationship-based deposits, which are the primary source of funding for retail and commercial lending, were $819 billion or 54% of our total funding (October 31, 2021 – $771 billion or 55%). The remaining portion is comprised of short-and long-term wholesale funding.

Funding for highly liquid assets consists primarily of short-term wholesale funding that reflects the monetization period of those assets. Long-term wholesale funding is used mostly to fund less liquid wholesale assets and to support liquid asset buffers.

Senior long-term debt issued by the bank on or after September 23, 2018, that has an original term greater than 400 days and is marketable, subject to certain exceptions, is subject to the Canadian Bank Recapitalization (Bail-in) regime. Under the Bail-in regime, in circumstances when the Superintendent of Financial Institutions has determined that a bank may no longer be viable, the Governor in Council may, upon a recommendation of the Minister of Finance that he or she is of the opinion that it is in the public interest to do so, grant an order directing the Canada Deposit Insurance Corporation (CDIC) to convert all or a portion of certain shares and liabilities of that bank into common shares. As at October 31, 2022, the notional value of issued and outstanding long-term debt subject to conversion under the Bail-in regime was $85 billion (October 31, 2021 – $53 billion).

For further details on our wholesale funding, refer to the Composition of wholesale funding tables below.

Long-term debt issuance

During 2022, we continued to experience favourable unsecured wholesale funding access and pricing. We issued, either directly or through our subsidiaries, unsecured long-term funding of $43 billion in various currencies and markets.

We primarily use residential mortgage and credit card securitization programs as alternative sources of funding and for liquidity and asset/liability management purposes. Our total secured long-term funding includes outstanding MBS sold, covered bonds that are collateralized with residential mortgages and securities backed by credit card receivables.

Compared to 2021, our outstanding MBS sold decreased $190 million. Our covered bonds and securitized credit card receivables increased $10 billion and $3 billion, respectively.

For further details, refer to the Off-balance sheet arrangements section.

Long-term funding sources*(1) — **Table 55**

	As at	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Unsecured long-term funding	**$ 119,241**	$ 89,447
Secured long-term funding	**68,953**	56,688
Subordinated debentures	**10,639**	9,620
	$ 198,833	$ 155,755

* This table represents an integral part of our 2022 Annual Consolidated Financial Statements.

(1) Based on original term to maturity greater than 1 year.

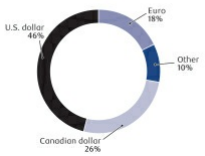
Our wholesale funding activities are well-diversified by geography, investor segment, instrument, currency, structure and maturity. We maintain an ongoing presence in different funding markets which allows us to continuously monitor market developments and trends, identify opportunities and risks, and take appropriate and timely actions. We operate long-term debt issuance registered programs. The following table summarizes these programs with their authorized limits by geography.

Programs by geography — **Table 56**

Canada	U.S.	Europe/Asia
• Canadian Shelf Program – $25 billion	• U.S. Shelf Program – US$50 billion	• European Debt Issuance Program – US$40 billion
		• Global Covered Bond Program – €75 billion
		• Japanese Issuance Programs – ¥1 trillion

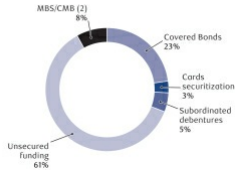
We also raise long-term funding using Canadian Senior Notes, Canadian National Housing Act MBS, Canada Mortgage Bonds, credit card receivable-backed securities, Kangaroo Bonds (issued in the Australian domestic market by foreign firms) and Yankee Certificates of Deposit (issued in the U.S. domestic market by foreign firms). We continuously evaluate opportunities to expand into new markets and untapped investor segments since diversification expands our wholesale funding flexibility, minimizes funding concentration and dependency, and generally reduces financing costs. As presented in the following charts, our current long-term debt profile is well-diversified by both currency and product. Maintaining competitive credit ratings is also critical to cost-effective funding.

Long-term debt (1) – funding mix by currency of issuance



(1) Includes unsecured and secured long-term funding and subordinated debentures with an original term to maturity greater than 1 year

Long-term debt (1) – funding mix by product



(1) Includes unsecured and secured long-term funding and subordinated debentures with an original term to maturity greater than 1 year
(2) Mortgage-backed securities and Canada Mortgage Bonds

The following table provides our composition of wholesale funding based on remaining term to maturity:

Composition of wholesale funding (1) **Table 57**

(Millions of Canadian dollars)	As at October 31, 2022							
	Less than 1 month	1 to 3 months	3 to 6 months	6 to 12 months	Less than 1 year sub-total	1 year to 2 years	2 years and greater	Total
Deposits from banks (2)	$ 5,758	$ 34	$ 311	$ 1,766	$ 7,869	$ –	$ –	$ 7,869
Certificates of deposit and commercial paper	9,482	16,575	23,676	39,674	89,407	–	–	89,407
Asset-backed commercial paper (3)	3,488	2,373	6,646	722	13,229	–	323	13,552
Senior unsecured medium-term notes (4)	375	5,968	2,846	13,189	22,378	19,108	48,556	90,042
Senior unsecured structured notes (5)	404	721	2,136	4,091	7,352	2,363	9,898	19,613
Mortgage securitization	–	1,238	421	2,614	4,273	2,402	9,697	16,372
Covered bonds/asset-backed securities (6)	–	1,016	1,960	2,838	5,814	4,575	42,194	52,583
Subordinated liabilities	60	–	–	110	170	1,483	8,986	10,639
Other (7)	7,241	2,934	8,673	4,387	23,235	10,219	409	33,863
Total	$ 26,808	$ 30,859	$ 46,669	$ 69,391	$ 173,727	$ 40,150	$ 120,063	$ 333,940
Of which:								
– Secured	$ 9,030	$ 6,641	$ 15,367	$ 7,536	$ 38,574	$ 6,977	$ 52,605	$ 98,156
– Unsecured	17,778	24,218	31,302	61,855	135,153	33,173	67,458	235,784

(Millions of Canadian dollars)	As at October 31, 2021							
	Less than 1 month	1 to 3 months	3 to 6 months	6 to 12 months	Less than 1 year sub-total	1 year to 2 years	2 years and greater	Total
Deposits from banks (2)	$ 5,202	$ –	$ –	$ –	$ 5,202	$ –	$ –	$ 5,202
Certificates of deposit and commercial paper	7,118	17,013	19,046	27,053	70,230	918	–	71,148
Asset-backed commercial paper (3)	2,378	2,563	4,076	3,697	12,714	–	–	12,714
Senior unsecured medium-term notes (4)	27	939	8,944	2,622	12,532	16,296	37,617	66,445
Senior unsecured structured notes (5)	118	825	817	714	2,474	2,914	5,879	11,267
Mortgage securitization	–	354	1,302	917	2,573	4,260	9,729	16,562
Covered bonds/asset-backed securities (6)	–	847	495	5,189	6,531	6,087	27,521	40,139
Subordinated liabilities	–	–	–	188	188	165	9,267	9,620
Other (7)	6,637	2,194	1,448	827	11,106	7,531	466	19,103
Total	$21,480	$24,735	$36,128	$41,207	$123,550	$38,171	$ 90,479	$ 252,200
Of which:								
– Secured	$ 8,467	$ 4,017	$ 6,108	$ 9,803	$ 28,395	$10,347	$ 37,695	$ 76,437
– Unsecured	13,013	20,718	30,020	31,404	95,155	27,824	52,784	175,763

(1) Excludes bankers' acceptances and repos.

(2) Excludes deposits associated with services we provide to banks (e.g., custody, cash management).

(3) Only includes consolidated liabilities, including our collateralized commercial paper program.

(4) Includes deposit notes.

(5) Includes notes where the payout is tied to movements in foreign exchange, commodities and equities.

(6) Includes credit card and mortgage loans.

(7) Includes tender option bonds (secured) of $6,038 million (October 31, 2021 – $7,020 million), bearer deposit notes (unsecured) of $5,805 million (October 31, 2021 – $3,798 million), other long-term structured deposits (unsecured) of $12,411 million (October 31, 2021 – $8,285 million), and FHLB advances (secured) of $9,609 million (October 31, 2021 – $nil).

Credit ratings
Our ability to access unsecured funding markets and to engage in certain collateralized business activities on a cost-effective basis are primarily dependent upon maintaining competitive credit ratings. Credit ratings and outlooks provided by rating agencies reflect their views and methodologies. Ratings are subject to change, based on a number of factors including, but not limited to, our financial strength, competitive position, liquidity and other factors not completely within our control.

The following table presents our major credit ratings:

Credit ratings (1) — **Table 58**

	As at November 29, 2022			
	Short-term debt	**Legacy senior long-term debt** (2)	**Senior long-term debt** (3)	**Outlook**
Moody's (4)	**P-1**	**Aa1**	**A1**	**stable**
Standard & Poor's (5)	**A-1+**	**AA-**	**A**	**stable**
Fitch Ratings (6)	**F1+**	**AA**	**AA-**	**stable**
DBRS (7)	**R-1 (high)**	**AA (high)**	**AA**	**stable**

(1) Credit ratings are not recommendations to purchase, sell or hold a financial obligation inasmuch as they do not comment on market price or suitability for a particular investor. Ratings are determined by the rating agencies based on criteria established from time to time by them, and are subject to revision or withdrawal at any time by the rating organization.
(2) Includes senior long-term debt issued prior to September 23, 2018 and senior long-term debt issued on or after September 23, 2018 which is excluded from the Bail-in regime.
(3) Includes senior long-term debt issued on or after September 23, 2018 which is subject to conversion under the Bail-in regime.
(4) On January 27, 2022, Moody's upgraded our long-term debt ratings and assessments, as well as affirmed our short-term debt ratings. Following this rating action, our outlook is stable. This rating action concludes the review for upgrade initiated by Moody's on October 7, 2021.
(5) On May 13, 2022, Standard & Poor's affirmed our ratings with a stable outlook.
(6) On July 11, 2022, Fitch Ratings affirmed our ratings with a stable outlook.
(7) On May 13, 2022, DBRS affirmed our ratings with a stable outlook.

Additional contractual obligations for rating downgrades
We are required to deliver collateral to certain counterparties in the event of a downgrade to our current credit rating. The following table provides the additional collateral obligations required at the reporting date in the event of a one-, two- or three-notch downgrade to our credit ratings. These additional collateral obligations are incremental requirements for each successive downgrade and do not represent the cumulative impact of multiple downgrades. The amounts reported change periodically as a result of several factors, including the transfer of trading activity to centrally cleared financial market infrastructures and exchanges, the expiration of transactions with downgrade triggers, the imposition of internal limitations on new agreements to exclude downgrade triggers, as well as normal course mark-to-market. There is no outstanding senior debt issued in the market that contains rating triggers that would lead to early prepayment of principal.

Additional contractual obligations for rating downgrades — **Table 59**

	As at					
	October 31 2022			October 31 2021		
(Millions of Canadian dollars)	**One-notch downgrade**	**Two-notch downgrade**	**Three-notch downgrade**	One-notch downgrade	Two-notch downgrade	Three-notch downgrade
Contractual derivatives funding or margin requirements	**$ 236**	**$ 146**	**$ 304**	$ 312	$ 112	$ 140
Other contractual funding or margin requirements (1)	**38**	**21**	**25**	157	13	–

(1) Includes GICs issued by our municipal markets business out of New York.

Liquidity Coverage Ratio (LCR)

The LCR is a Basel III metric that measures the sufficiency of high-quality liquid assets (HQLA) available to meet liquidity needs over a30-day period in an acute stress scenario. The BCBS and OSFI regulatory minimum coverage level for LCR is 100%.

OSFI requires Canadian banks to disclose the LCR using the standard Basel disclosure template and calculated using the average of daily LCR positions during the quarter.

Liquidity coverage ratio common disclosure template (1) **Table 60**

(Millions of Canadian dollars, except percentage amounts)	For the three months ended October 31 2022 Total unweighted value (average) (2)	Total weighted value (average)
High-quality liquid assets		
Total high-quality liquid assets (HQLA)		$ 364,478
Cash outflows		
Retail deposits and deposits from small business customers, of which:	$ 375,324	$ 34,797
Stable deposits (3)	127,692	3,831
Less stable deposits	247,632	30,966
Unsecured wholesale funding, of which:	431,484	201,688
Operational deposits (all counterparties) and deposits in networks of cooperative banks (4)	180,787	43,066
Non-operational deposits	220,941	128,866
Unsecured debt	29,756	29,756
Secured wholesale funding		31,881
Additional requirements, of which:	334,060	78,395
Outflows related to derivative exposures and other collateral requirements	75,312	21,750
Outflows related to loss of funding on debt products	10,214	10,214
Credit and liquidity facilities	248,534	46,431
Other contractual funding obligations (5)	22,080	22,080
Other contingent funding obligations (6)	710,472	11,498
Total cash outflows		$ 380,339
Cash inflows		
Secured lending (e.g., reverse repos)	$ 286,914	$ 50,441
Inflows from fully performing exposures	15,716	9,934
Other cash inflows	28,346	28,346
Total cash inflows		$ 88,721
		Total adjusted value
Total HQLA		$ 364,478
Total net cash outflows		291,618
Liquidity coverage ratio		125%

(Millions of Canadian dollars, except percentage amounts)	July 31 2022 Total adjusted value
Total HQLA	$ 353,406
Total net cash outflows	287,871
Liquidity coverage ratio	123%

(1) The LCR is calculated in accordance with OSFI's LAR guideline, which, in turn, reflects liquidity-related requirements issued by the BCBS. The LCR for the quarter ended October 31, 2022 is calculated as an average of 62 daily positions.

(2) With the exception of other contingent funding obligations, unweighted inflow and outflow amounts are items maturing or callable in 30 days or less. Other contingent funding obligations also include debt securities with remaining maturity greater than 30 days.

(3) As defined by the BCBS, stable deposits from retail and small business customers are deposits that are insured and are either held in transactional accounts or the bank has an established relationship with the client making the withdrawal unlikely.

(4) Operational deposits from customers other than retail and small andmedium-sized enterprises, are deposits which clients need to keep with the bank in order to facilitate their access and ability to use payment and settlement systems primarily for clearing, custody and cash management activities.

(5) Other contractual funding obligations primarily include outflows from unsettled securities trades and outflows from obligations related to securities sold short.

(6) Other contingent funding obligations include outflows related to otheroff-balance sheet facilities that carry low LCR runoff factors (0% – 5%).

We manage our LCR position within a target range that reflects our liquidity risk tolerance and takes into account business mix, asset composition and funding capabilities. The range is subject to periodic review in light of changes to internal requirements and external developments.

We maintain HQLAs in major currencies with dependable market depth and breadth. Our treasury management practices ensure that the levels of HQLA are actively managed to meet target LCR objectives. Our Level 1 assets, as calculated according to OSFI LAR and the BCBS LCR requirements, represent 89% of total HQLA. These assets consist of cash, placements with central banks and highly rated securities issued or guaranteed by governments, central banks and supranational entities.

LCR captures cash flows from on- and off-balance sheet activities that are either expected or could potentially occur within 30 days in an acute stress scenario. Cash outflows result from the application of withdrawal and non-renewal factors to demand and term deposits, differentiated by client type (wholesale, retail and small- and medium-sized enterprises). Cash outflows also arise from business activities that create contingent funding and collateral requirements, such as repo funding, derivatives, short sales of securities and the extension of credit and liquidity commitments to clients. Cash inflows arise primarily from maturing secured loans, interbank loans and non-HQLA securities.

LCR does not reflect any market funding capacity that we believe would be available in a stress situation. All maturing wholesale debt is assigned 100% outflow in the LCR calculation.

Q4 2022 vs. Q3 2022

The average LCR for the quarter ended October 31, 2022 was 125%, which translates into a surplus of approximately $73 billion, compared to 123% and a surplus of approximately $66 billion in the prior quarter. LCR has increased compared to last quarter as loan growth was more than offset by an increase in volume and change in mix of client deposits, as well as by issuances of term funding.

Net Stable Funding Ratio (NSFR)

NSFR is a Basel III metric that measures the sufficiency of available stable funding relative to the amount of required stable funding. The BCBS and OSFI regulatory minimum coverage level for NSFR is 100%.

Available stable funding is defined as the portion of capital and liabilities expected to be reliable over the time horizon considered by the NSFR, which extends to one year. Required stable funding is a function of the liquidity characteristics and residual maturities of the various assets held by the bank as well as those of its off-balance sheet exposures.

OSFI requires Canadian D-SIBs to disclose the NSFR using the standard Basel disclosure template. Amounts presented in this disclosure template are determined in accordance with the requirements of OSFI's LAR guideline and are not necessarily aligned with the classification requirements prescribed under IFRS.

Net Stable Funding Ratio common disclosure template (1) — **Table 61**

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2022				
	Unweighted value by residual maturity (2)				Weighted value
	No maturity	< 6 months	6 months to < 1 year	≥ 1 year	
Available Stable Funding (ASF) Item					
Capital:	$ 108,053	$ –	$ –	$ 9,608	$ 117,661
Regulatory Capital	108,053	–	–	9,608	117,661
Other Capital Instruments	–	–	–	–	–
Retail deposits and deposits from small business customers:	326,492	71,417	37,631	32,190	431,963
Stable deposits (3)	106,488	32,742	20,284	14,246	165,785
Less stable deposits	220,004	38,675	17,347	17,944	266,178
Wholesale funding:	312,346	438,928	79,690	121,004	340,812
Operational deposits (4)	186,282	–	–	–	93,141
Other wholesale funding	126,064	438,928	79,690	121,004	247,671
Liabilities with matching interdependent assets (5)	–	3,298	4,950	21,456	–
Other liabilities:	41,545		214,175		14,020
NSFR derivative liabilities			34,934		
All other liabilities and equity not included in the above categories	41,545	164,329	1,785	13,127	14,020
Total ASF					$ 904,456
Required Stable Funding (RSF) Item					
Total NSFR high-quality liquid assets (HQLA)					$ 38,537
Deposits held at other financial institutions for operational purposes	–	1,403	–	–	701
Performing loans and securities:	198,407	295,131	107,266	507,939	661,461
Performing loans to financial institutions secured by Level 1 HQLA	–	111,525	15,189	15	14,312
Performing loans to financial institutions secured by non-Level 1 HQLA and unsecured performing loans to financial institutions	4,000	99,000	26,949	26,099	54,587
Performing loans to non-financial corporate clients, loans to retail and small business customers, and loans to sovereigns, central banks and PSEs, of which:	121,583	63,827	30,277	156,711	279,382
With a risk weight of less than or equal to 35% under the Basel II standardized approach for credit risk	–	843	691	3,181	2,834
Performing residential mortgages, of which:	38,539	17,969	33,986	298,856	259,881
With a risk weight of less than or equal to 35% under the Basel II standardized approach for credit risk	38,539	17,952	33,951	297,918	259,057
Securities that are not in default and do not qualify as HQLA, including exchange-traded equities	34,285	2,810	865	26,258	53,299
Assets with matching interdependent liabilities (5)	–	3,298	4,950	21,456	–
Other assets:	1,772		300,342		81,558
Physical traded commodities, including gold	1,772				1,506
Assets posted as initial margin for derivative contracts and contributions to default funds of CCPs			26,604		22,613
NSFR derivative assets			26,795		–
NSFR derivative liabilities before deduction of variation margin posted			70,722		3,536
All other assets not included in the above categories	–	123,852	8	52,361	53,903
Off-balance sheet items			711,922		26,997
Total RSF					$ 809,254
Net Stable Funding Ratio (%)					112%

(Millions of Canadian dollars, except percentage amounts)	As at July 31, 2022
	Weighted value
Total ASF	$884,887
Total RSF	784,537
Net Stable Funding Ratio (%)	113%

(1) The NSFR is calculated in accordance with OSFI's Liquidity Adequacy Requirements (LAR) guideline, which, in turn, reflects liquidity-related requirements issued by the BCBS.

(2) Totals for the following rows encompass the residual maturity categories of less than 6 months, 6 months to less than 1 year, and greater than or equal to 1 year in accordance with the requirements of the common disclosure template prescribed by OSFI: Other liabilities, NSFR derivative liabilities, Other assets, Assets posted as initial margin for derivative contracts and contributions to default funds of CCPs, NSFR derivative assets, NSFR derivative liabilities before deduction of variation margin posted, and Off-balance sheet items.

(3) As defined by the BCBS, stable deposits from retail and small business customers are deposits that are insured and are either held in transactional accounts or the bank has an established relationship with the client making the withdrawal unlikely.

(4) Operational deposits from customers other than retail and small andmedium-sized enterprises, are deposits which clients need to keep with the bank in order to facilitate their access and ability to use payment and settlement systems primarily for clearing, custody and cash management activities.

(5) Interdependent assets and liabilities represent National Housing Act Mortgage-Backed Securities (NHA MBS) liabilities, including liabilities arising from transactions involving the Canada Mortgage Bond program and their corresponding encumbered mortgages.

Available stable funding is comprised primarily of a diversified pool of personal and commercial deposits, capital, as well as long-term wholesale liabilities. Required stable funding is driven mainly by the bank's mortgage and loan portfolio, secured loans to financial institutions and to a lesser extent by other less liquid assets. NSFR does not reflect any unused market funding capacity that we believe is available to the bank.

Volume and composition of available stable funding is actively managed to optimize our structural funding position and meet NSFR objectives. Our NSFR is managed in accordance with our comprehensive LRMF.

Q4 2022 vs. Q3 2022

The NSFR as at October 31, 2022 was 112%, which translates into a surplus of approximately $95 billion, compared to 113% and a surplus of approximately $100 billion in the prior quarter. NSFR remained relatively flat compared to last quarter as growth in loans and securities was offset by issuance of term funding and increases in client deposits.

Contractual maturities of financial assets, financial liabilities and off-balance sheet items

The following tables provide remaining contractual maturity profiles of all our assets, liabilities, and off-balance sheet items at their carrying value (e.g., amortized cost or fair value) at the balance sheet date. Off-balance sheet items are allocated based on the expiry date of the contract.

Details of contractual maturities and commitments to extend funds are a source of information for the management of liquidity risk. Among other purposes, these details form a basis for modelling a behavioural balance sheet with effective maturities to calculate liquidity risk measures. For further details, refer to the Risk measurement section.

Contractual maturities of financial assets, financial liabilities and off-balance sheet items — **Table 62**

	As at October 31, 2022									
(Millions of Canadian dollars)	Less than 1 month	1 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	1 year to 2 years	2 years to 5 years	5 years and greater	With no specific maturity	Total
Assets										
Cash and deposits with banks	$ 177,946	$ 2	$ –	$ –	$ –	$ –	$ –	$ –	$ 2,460	$ 180,408
Securities										
Trading (1)	86,491	592	71	8	–	104	170	8,710	52,059	148,205
Investment, net of applicable allowance	3,250	7,490	7,390	3,537	4,873	12,303	50,979	79,387	809	170,018
Assets purchased under reverse repurchase agreements and securities borrowed (2)	122,836	76,590	58,750	19,246	17,212	1,131	–	–	22,080	317,845
Loans, net of applicable allowance	31,203	21,795	29,253	39,919	34,658	150,826	348,411	75,091	88,809	819,965
Other										
Customers' liability under acceptances	11,632	6,235	5	–	–	–	–	–	(45)	17,827
Derivatives	13,100	19,753	10,184	7,004	6,009	20,709	36,081	41,571	28	154,439
Other financial assets	48,485	1,964	1,666	199	457	246	231	2,364	3,025	58,637
Total financial assets	494,943	134,421	107,319	69,913	63,209	185,319	435,872	207,123	169,225	1,867,344
Other non-financial assets	6,744	1,609	196	(357)	2,647	1,691	2,510	5,192	29,643	49,875
Total assets	$ 501,687	$136,030	$107,515	$69,556	$65,856	$ 187,010	$ 438,382	$ 212,315	$198,868	$1,917,219
Liabilities and equity										
Deposits (3)										
Unsecured borrowing	$ 91,052	$ 56,920	$ 52,671	$64,685	$83,220	$ 39,327	$ 60,161	$ 18,500	$645,195	$1,111,731
Secured borrowing	4,343	6,271	7,365	2,007	4,626	6,059	15,400	7,824	–	53,895
Covered bonds	–	1,016	1,960	1,993	–	3,839	28,692	5,688	–	43,188
Other										
Acceptances	11,632	6,235	5	–	–	–	–	–	–	17,872
Obligations related to securities sold short	35,511	–	–	–	–	–	–	–	–	35,511
Obligations related to assets sold under repurchase agreements and securities loaned (2)	211,929	35,600	7,743	1,055	313	946	–	–	16,361	273,947
Derivatives	13,096	22,073	10,994	7,097	5,244	20,135	34,226	40,626	–	153,491
Other financial liabilities	57,152	1,390	1,353	656	958	892	2,378	11,411	1,117	77,307
Subordinated debentures	–	–	–	110	–	–	1,881	8,034	–	10,025
Total financial liabilities	424,715	129,505	82,091	77,603	94,361	71,198	142,738	92,083	662,673	1,776,967
Other non-financial liabilities	1,021	6,585	298	156	178	1,046	1,073	12,357	9,363	32,077
Equity	–	–	–	–	–	–	–	–	108,175	108,175
Total liabilities and equity	$ 425,736	$136,090	$ 82,389	$77,759	$94,539	$ 72,244	$ 143,811	$ 104,440	$780,211	$1,917,219
Off-balance sheet items										
Financial guarantees	$ 545	$ 2,211	$ 3,745	$ 3,274	$ 3,446	$ 1,415	$ 4,550	$ 1,068	$ 37	$ 20,291
Commitments to extend credit	7,016	6,879	14,184	21,094	17,133	49,135	193,990	19,269	4,516	333,216
Other credit-related commitments	1,934	1,135	1,674	1,448	1,469	541	520	85	90,821	99,627
Other commitments	24	11	16	16	16	60	136	187	849	1,315
Total off-balance sheet items	$ 9,519	$ 10,236	$ 19,619	$25,832	$22,064	$ 51,151	$ 199,196	$ 20,609	$ 96,223	$ 454,449

(1) Trading debt securities classified as FVTPL have been included in the less than 1 month category as there is no expectation to hold these assets to their contractual maturity.

(2) Open reverse repo and repo contracts, which have no set maturity date and are typically short term, have been included in the with no specific maturity category.

(3) A major portion of relationship-based deposits are repayable on demand or at short notice on a contractual basis while, in practice, these customer balances form a core base for our operations and liquidity needs, as explained in the preceding Deposit and funding profile section.

	As at October 31, 2021									
(Millions of Canadian dollars)	Less than 1 month	1 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	1 year to 2 years	2 years to 5 years	5 years and greater	With no specific maturity	Total
Assets										
Cash and deposits with banks	$ 190,995	$ 2	$ 1	$ –	$ –	$ –	$ –	$ –	$ 2,486	$ 193,484
Securities										
Trading (1)	67,655	46	87	41	6	20	169	9,845	61,371	139,240
Investment, net of applicable allowance	7,220	4,811	5,546	5,832	5,514	22,368	31,393	62,289	511	145,484
Assets purchased under reverse repurchase agreements and securities borrowed (2)	104,301	89,612	51,664	22,982	16,987	98	–	–	22,259	307,903
Loans, net of applicable allowance	28,517	21,630	26,094	31,910	26,921	139,050	298,659	62,215	82,579	717,575
Other										
Customers' liability under acceptances	12,654	7,209	5	–	–	5	–	–	(75)	19,798
Derivatives	5,325	10,788	4,318	4,334	3,005	10,139	17,890	39,733	9	95,541
Other financial assets	33,149	1,523	1,942	145	135	270	277	2,044	3,351	42,836
Total financial assets	449,816	135,621	89,657	65,244	52,568	171,950	348,388	176,126	172,491	1,661,861
Other non-financial assets	6,079	1,681	164	217	185	1,957	2,377	5,898	25,904	44,462
Total assets	$ 455,895	$ 137,302	$ 89,821	$ 65,461	$ 52,753	$ 173,907	$ 350,765	$ 182,024	$ 198,395	$ 1,706,323
Liabilities and equity										
Deposits (3)										
Unsecured borrowing	$ 82,183	$ 44,058	$ 56,519	$ 36,342	$ 35,792	$ 30,625	$ 45,745	$ 18,320	$ 661,924	$ 1,011,508
Secured borrowing	2,442	4,244	7,543	4,362	2,804	9,557	15,040	6,118	–	52,110
Covered bonds	1	848	–	2,693	1,878	5,350	18,321	8,122	–	37,213
Other										
Acceptances	12,653	7,207	5	2	–	5	–	–	1	19,873
Obligations related to securities sold short	37,841	–	–	–	–	–	–	–	–	37,841
Obligations related to assets sold under repurchase agreements and securities loaned (2)	168,763	62,338	5,610	4,742	848	668	–	–	19,232	262,201
Derivatives	5,456	9,903	4,938	3,747	2,723	9,211	18,727	36,733	1	91,439
Other financial liabilities	33,489	1,299	1,048	439	373	1,000	2,115	10,226	795	50,784
Subordinated debentures	–	–	–	–	188	110	1,912	7,383	–	9,593
Total financial liabilities	342,828	129,897	75,663	52,327	44,606	56,526	101,860	86,902	681,953	1,572,562
Other non-financial liabilities	1,663	6,907	434	290	155	1,108	1,172	13,360	9,910	34,999
Equity	–	–	–	–	–	–	–	–	98,762	98,762
Total liabilities and equity	$ 344,491	$ 136,804	$ 76,097	$ 52,617	$ 44,761	$ 57,634	$ 103,032	$ 100,262	$ 790,625	$ 1,706,323
Off-balance sheet items										
Financial guarantees	$ 387	$ 1,950	$ 2,999	$ 2,928	$ 2,206	$ 1,829	$ 3,326	$ 1,181	$ 61	$ 16,867
Commitments to extend credit	5,964	5,538	11,400	16,231	12,024	56,688	160,789	16,733	4,544	289,911
Other credit-related commitments	966	1,064	1,569	1,536	1,376	370	726	38	99,815	107,460
Other commitments	101	11	20	21	21	64	144	278	618	1,278
Total off-balance sheet items	$ 7,418	$ 8,563	$ 15,988	$ 20,716	$ 15,627	$ 58,951	$ 164,985	$ 18,230	$ 105,038	$ 415,516

(1) Trading debt securities classified as FVTPL have been included in the less than 1 month category as there is no expectation to hold these assets to their contractual maturity.

(2) Open reverse repo and repo contracts, which have no set maturity date and are typically short term, have been included in the with no specific maturity category.

(3) A major portion of relationship-based deposits are repayable on demand or at short notice on a contractual basis while, in practice, these customer balances form a core base for our operations and liquidity needs, as explained in the preceding Deposit and funding profile section.

Contractual maturities of financial liabilities and off-balance sheet items – undiscounted basis

The following tables provide remaining contractual maturity analysis of our financial liabilities and off-balance sheet items. The amounts disclosed in the following table are the contractual undiscounted cash flows of all financial liabilities (e.g., par value or amount payable upon maturity). The amounts do not reconcile directly with those in our consolidated balance sheets as the table incorporates only cash flows relating to payments on maturity and do not recognize premiums, discounts or mark-to-market adjustments recognized in the instruments' carrying values as at the balance sheet date. Financial liabilities are based upon the earliest period in which they are required to be paid. For off-balance sheet items, the undiscounted cash flows potentially payable under financial guarantees and commitments to extend credit are classified on the basis of the earliest date they can be called.

Contractual maturities of financial liabilities and off-balance sheet items – undiscounted basis* **Table 63**

	As at October 31, 2022					
(Millions of Canadian dollars)	On demand	Within 1 year	1 year to 2 years	2 years to 5 years	5 years and greater	Total
Financial liabilities						
Deposits (1)	**$ 562,288**	**$ 463,711**	**$ 50,169**	**$ 106,568**	**$ 37,260**	**$ 1,219,996**
Other						
Acceptances	**–**	**17,872**	**–**	**–**	**–**	**17,872**
Obligations related to securities sold short	**–**	**35,395**	**–**	**–**	**–**	**35,395**
Obligations related to assets sold under repurchase agreements and securities loaned	**16,367**	**256,756**	**948**	**–**	**–**	**274,071**
Other liabilities	**508**	**61,420**	**220**	**709**	**9,191**	**72,048**
Lease liabilities	**–**	**654**	**630**	**1,609**	**2,217**	**5,110**
Subordinated debentures	**–**	**110**	**–**	**1,884**	**8,042**	**10,036**
	579,163	**835,918**	**51,967**	**110,770**	**56,710**	**1,634,528**
Off-balance sheet items						
Financial guarantees (2)	**$ 20,289**	**$ 2**	**$ –**	**$ –**	**$ –**	**$ 20,291**
Other commitments (3)	**–**	**73**	**60**	**136**	**187**	**456**
Commitments to extend credit (2)	**284,606**	**48,573**	**1**	**36**	**–**	**333,216**
	304,895	**48,648**	**61**	**172**	**187**	**353,963**
Total financial liabilities and off-balance sheet items	**$ 884,058**	**$ 884,566**	**$ 52,028**	**$ 110,942**	**$ 56,897**	**$ 1,988,491**

	As at October 31, 2021					
(Millions of Canadian dollars)	On demand	Within 1 year	1 year to 2 years	2 years to 5 years	5 years and greater	Total
Financial liabilities						
Deposits (1)	$ 576,161	$ 367,389	$ 44,951	$ 78,071	$ 33,063	$ 1,099,635
Other						
Acceptances	1	19,867	5	–	–	19,873
Obligations related to securities sold short	–	37,462	–	–	–	37,462
Obligations related to assets sold under repurchase agreements and securities loaned	19,234	242,314	669	–	–	262,217
Other liabilities	620	35,984	384	544	7,873	45,405
Lease liabilities	–	631	582	1,522	2,342	5,077
Subordinated debentures	–	188	110	1,916	7,392	9,606
	596,016	703,835	46,701	82,053	50,670	1,479,275
Off-balance sheet items						
Financial guarantees (2)	$ 16,867	$ –	$ –	$ –	$ –	$ 16,867
Other commitments (3)	–	81	82	209	344	716
Commitments to extend credit (2)	248,594	41,238	77	2	–	289,911
	265,461	41,319	159	211	344	307,494
Total financial liabilities and off-balance sheet items	$ 861,477	$ 745,154	$ 46,860	$ 82,264	$ 51,014	$ 1,786,769

* This table represents an integral part of our 2022 Annual Consolidated Financial Statements.

(1) A major portion of relationship-based deposits are repayable on demand or at short notice on a contractual basis while, in practice, these customer balances form a core base for our operations and liquidity needs, as explained in the preceding Deposit and funding profile.

(2) We believe that it is highly unlikely that all or substantially all of these guarantees and commitments will be drawn or settled within one year, and contracts may expire without being drawn or settled. The management of the liquidity risk associated with potential extensions of funds is outlined in the preceding Risk measurement section.

(3) Includes commitments related to short-term andlow-dollar value leases, leases not yet commenced, and lease payments related tonon-recoverable tax.

Insurance risk

Insurance risk refers to the potential financial loss that may arise where the amount, timing and/or frequency of benefit and/or premium payments under insurance and reinsurance contracts are different than expected. Insurance risk is distinct from those risks covered by other parts of our risk management framework (e.g., credit, market and operational risk) where those risks are ancillary to, or accompany, the risk transfer. The five insurance sub-risks are: morbidity, mortality, longevity, policyholder behaviour (lapse), and travel risk.

Our Insurance Risk Management Framework provides an overview of our processes and tools for identifying, assessing, managing, mitigating and reporting on the insurance risks that face the organization. These are also supported by our robust three lines of defence governance structure, which is consistent with our Enterprise Risk Management Framework.

Operational/regulatory compliance risk drivers

Operational risk

Operational risk is the risk of loss or harm resulting from people, inadequate or failed internal processes, controls and systems or from external events. Operational risk is inherent in all of our activities and third-party activities and failure to manage operational risk can result in direct or indirect financial loss, reputational impact or regulatory scrutiny and proceedings in the various jurisdictions where we operate.

Our management of operational risk follows the three lines of defence governance model, encompassing the organizational roles and responsibilities for a coordinated enterprise-wide approach. For further details, refer to the Risk management – Enterprise risk management section.

Operational risk framework

We have an Enterprise Operational Risk Framework which sets out the processes to identify, assess, monitor, measure, report and communicate on operational risk. The processes are established through the following:

- Risk identification and assessment tools, including the collection and analysis of risk event data, help risk owners understand and proactively manage operational risk exposures. Risk assessments are intended to ensure alignment between risk exposures and efforts to manage them. Management uses outputs of these tools to make informed risk decisions.
- Risk monitoring tools alert management to changes in the operational risk profile. When paired with escalation and monitoring triggers, risk monitoring tools can identify risk trends, warn management of risk levels that approach or exceed defined limits, as well as prompt actions and mitigation plans to be undertaken.
- Risk capital measurement is designed to provide credible estimation of potential risk exposure, including surfacing risk vulnerabilities, and informs strategic and capital planning decisions, which are ultimately intended to ensure that the bank is sufficiently resilient to withstand operational risk losses both in normal times and under stress situations.
- Risk reporting and communication processes seek to ensure that relevant operational risk information is made available to management in a timely manner to support risk-informed business decisions.

Conclusions from our operational risk programs enable learning based on what has occurred, insights into whether it could happen elsewhere in the organization, and what controls we need to amend or implement. These conclusions support the articulation of our operational risk appetite and are used to inform the overall level of operational risk exposure which thereby defines our operational risk profile. This profile includes significant operational risk exposures, potential new and emerging exposures and trends, and overall conclusions on the control environment and risk outlook.

We consider the potential risks and rewards of our decisions to strike a balance between accepting potential losses versus incurring costs of mitigation, the expression of which is in the form of our operational risk appetite. Our operational risk appetite is established at the Board level and cascaded throughout each of our business segments. We proactively identify and investigate corporate insurance opportunities to mitigate and reduce potential future impacts of operational risk.

Management reports have been implemented at various levels to support proactive management of operational risk and transparency of risk exposures. These reports are provided to senior management on a regular basis and provide detail on the main drivers of the risk status and trend for each of our business segments and the bank overall. In addition, changes to the operational risk profile that are not aligned to our business strategy or operational risk appetite are identified and discussed at GRC and the Risk Committee of the Board.

Our operations expose us to many different operational risks, which may adversely affect our businesses and financial results. The following list is not exhaustive, as other factors could also adversely affect our results.

Operational risk	Management strategy
Information technology and cybersecurity risk 	Information technology risk is the risk associated with the use, ownership, operation, and adoption of information systems that can result in business interruptions, client service disruptions and loss of confidential information causing financial loss, reputational damage and regulatory fines and penalties. We maintain a risk driven program to address the risks following our operational risk framework supported by a global team of technology risk management experts. Cybersecurity risk is the risk to the business associated with cyber-attacks initiated to disrupt or disable our operations or to expose or damage data. We have a dedicated team of technology and cybersecurity professionals that manage a comprehensive program to help protect the organization against breaches and other incidents by ensuring appropriate security and operational controls are in place. We continue to strengthen our cyber-control framework and to improve our resilience and cybersecurity capabilities including 24 hour monitoring, cyber intelligence analysis of internal and external threats and alerting of potentially suspicious security events and incidents. Throughout the year, we continued to invest in our cybersecurity program, and multiple scenarios, assessments and simulations were conducted to test our resiliency strategy.
Information management and privacy risk 	Information management risk is the risk of failing to manage information appropriately through its lifecycle due to inadequate processes, controls and technology resulting in legal and regulatory consequences, reputational damage and/or financial loss. We have made substantial investments in the Enterprise Chief Data Office (CDO) and functional and regional data management and data governance units to promote awareness of and effectively manage information management risk. Managing information management risk is fundamental to realizing our Data Vision, which is to become a data-driven organization that uses data effectively and efficiently to improve client experience and decision-making. Privacy risk is the risk of improper creation or collection, use, disclosure, retention or destruction of information. The collection, use and sharing of data, as well as the management and governance of data, are increasingly important as we continue to invest in digital solutions and innovation, as well as expanding our business activities. This is also reflected through regulatory developments relating to data privacy. The CDO and the Chief Privacy Office partner with cross-functional teams to develop and implement enterprise-wide standards and practices that describe how data is used, protected, managed and governed.
Money laundering and Terrorist financing risk 	Money laundering and Terrorist financing risk is the risk that our products and services are used to facilitate the laundering of proceeds of crime or the financing of terrorist activity. We maintain an enterprise-wide program designed to deter, detect and report suspected money laundering and terrorist financing activities across our organization, while seeking to ensure compliance with the laws and regulations of the various jurisdictions in which we operate. Our Enterprise Financial Crimes program is dedicated to the continuous development and maintenance of robust policies, guidelines, training, risk-assessment tools and models to enable our employees to manage evolving money laundering and terrorist financing risks and regulatory expectations. The Enterprise Financial Crimes program is regularly evaluated in an effort to ensure it remains aligned with industry standards, best practices and all applicable laws, regulations and guidance. Risks of non-compliance include enforcement actions, criminal prosecutions and reputational damage.
Third-party risk 	Third-party risk is the risk of failure to effectively manage third parties which may expose us to service disruptions, regulatory action, financial loss, litigation or reputational damage. We have a risk-based enterprise-wide program designed to provide oversight for third-party relationships that enables us to respond effectively to events that can cause service disruptions, financial loss or various other risks that could impact us. Our approach to third-party risk mitigation is outlined in policies and standards that establish the minimum requirements for identifying and managing risks throughout the engagement with a third-party, while ensuring compliance with global regulatory expectations. We monitor third-party providers that we consider critical to our operations for any impact on their ability to deliver services to us, including vendors of our third-party providers.
Business continuity risk 	Business continuity risk is the risk of being unable to maintain, continue or restore essential business operations during and/or after an event that prevents us from conducting business in the normal course. Exposure to disruptive operational events interrupts the continuity of our business operations and could negatively impact our financial results, reputation, client outcomes and/or result in harm to our employees. These operational events could result from the impact of severe weather, pandemics, failed processes, technology failures or cyber threats. Our risk-based enterprise-wide business continuity management program considers multiple scenarios to address the consequences of a disruption and its effects on the availability of our people, processes, facilities, technology, and third-party arrangements. Our approach to business continuity management is outlined in policies and standards embedded across the organization and the related risks are regularly measured, monitored, reported and integrated in our operational risk management and control framework.

Operational risk capital
Requirements for operational risk capital are determined in accordance with OSFI issued guidelines. Currently, our operational risk capital is assessed using the Standardized Approach (TSA) which is a formula-based calculation predicated on gross income. Upon implementation of final Basel III reforms, OSFI will require deposit-taking institutions to adopt a new Standardized Approach (SA) in Q2 2023 for measurement of operational risk capital. The SA methodology is based on the Business Indicator Component (BIC), which is a financial statement-based proxy for operational risk, and the Internal Loss Multiplier, a scaling factor that is based on the historical internal loss average relative to the BIC. Once implemented, SA will replace TSA. For further details on operational risk capital, refer to the Capital management section.

Operational risk loss events
As at October 31, 2022, our operational risk losses remain within our risk appetite. For further details on our contingencies, including litigation, refer to Notes 24 and 25 of our 2022 Annual Consolidated Financial Statements.

Culture and conduct risk
Our values set the tone of our organizational culture and translate into desired behaviours as articulated in our Code of Conduct and leadership model. We define conduct as the manifestation of culture through the behaviours, judgment, decisions, and actions of the organization and its employees. Our organizational direction establishes the expectation of good conduct outcomes as the operating norm for the organization, all employees, and third-party service providers operating on our behalf to drive positive outcomes for our clients, employees, stakeholders, financial markets and our reputation. We hold ourselves to the highest standards of conduct to build the trust of our clients, investors, colleagues and community. The desired outcomes from effective culture and conduct practices align with our purpose and values and support our risk appetite statements.

Risk culture is a subset of our overall culture that influences how, individually and collectively, we take and manage risks. Our risk culture helps us identify and understand risks, openly discuss risks, and act on the organization's current and perceived future risks. Our risk culture practices are grounded in our existing risk management and human resource disciplines and protocols. When combined with the elements of effective leadership and values, these practices provide a base from which the resulting risk culture and conduct can be assessed, monitored, sustained and subjected to ongoing enhancement.

Our Board-approved Enterprise Culture and Conduct Risks Framework provides organizational direction and describes our approach to a set of related topics applicable to all risk categories such as fair outcomes for clients and other stakeholders, culture, including accountability and risk culture, conduct risk, sales conduct and client practices, and misconduct.

On a regular basis, management communicates behavioural expectations to our employees with an emphasis on conduct and values. Our leadership model also supports and encourages effective challenge between the businesses and control functions. These behavioural expectations are supported by tools and resources which are designed to help employees live our values, report misconduct and raise concerns, including those that might have ethical implications. We are committed to fostering an environment where employees feel safe to speak up without retaliation. Employees have the ability to report matters through a global anonymous Conduct Hotline. In addition, our Code of Conduct outlines an employee's responsibility to be truthful, respect others, and comply with laws, regulations and our policies. Anyone who breaches or fails to report an actual or possible breach of the Code of Conduct is subject to corrective or disciplinary action. This can range from reprimands and impacts on performance ratings and compensation, to termination of employment relationships with the organization. Internal audits, including behavioural science reviews with recommendations are also conducted to better understand and enhance employee attitudes and behaviours as they relate to risk management.



Regulatory compliance risk

Regulatory compliance risk is the risk of potential non-conformance with laws, rules, regulations and prescribed practices in any jurisdiction in which we operate. Issues regarding compliance with laws and regulations can arise in a number of areas in large complex financial institutions, such as ourselves, and are often the result of inadequate or failed internal processes, controls, people or systems. We currently are, and may be at any given time, subject to a number of legal and regulatory proceedings and subject to numerous governmental and regulatory examinations, investigations and other inquiries.

Laws and regulations are in place to protect the financial and other interests of our clients, investors and the public. As a large-scale global financial institution, we are subject to numerous laws and extensive and evolving regulation by governmental agencies, supervisory authorities and self-regulatory organizations in Canada, the U.S., the U.K., Europe and other jurisdictions in which we operate. Such regulation continues to become increasingly extensive and complex. In addition, regulatory scrutiny and expectations in Canada, the U.S., the U.K., Europe and other jurisdictions for large financial institutions with respect to, among other things, governance, risk management practices and controls, and conduct, as well as the enforcement of regulatory compliance matters, has intensified. Failure to comply with these regulatory requirements and expectations or to resolve any identified deficiencies could result in increased regulatory oversight and restrictions. Resolution of such matters can also result in the payment of substantial penalties, agreements with respect to future operation of our business, actions with respect to relevant personnel, admission of wrongdoing, and guilty pleas with respect to criminal charges, which may in turn prohibit us from conducting certain types of business absent regulatory relief.

Operating in this increasingly complex regulatory environment and intense regulatory enforcement environment, we are and have been subject to a variety of legal proceedings, including civil claims and lawsuits, criminal charges, regulatory scrutiny, examinations and proceedings, investigations, audits and requests for information by various governmental regulatory agencies and law enforcement authorities in various jurisdictions, and we anticipate that our ongoing business activities will give rise to such matters in the future. The global scope of our operations also means that a single issue may give rise to overlapping regulatory investigations, regulatory proceedings and or civil litigation claims in different jurisdictions. RBC can be subject to such proceedings due to alleged violations of law or, if determined by regulators, allegedly inadequate policies, procedures, controls or remediation of deficiencies. Changes to laws, including tax laws, regulations or regulatory policies, as well as the changes in how they are interpreted, implemented or enforced, could adversely affect us, for example, by lowering barriers to entry in the businesses in which we operate, increasing our costs of compliance, or limiting our activities and ability to execute our strategic plans. In addition, the severity of the remedies sought in legal and regulatory proceedings to which RBC is subject have increased. Further, there is no assurance that we always will be, or be deemed to be, in compliance with laws, regulations or regulatory policies or expectations. Accordingly, it is possible that we could receive a judicial or regulatory enforcement judgment or decision that results in significant fines, damages, penalties, and other costs or injunctions, criminal convictions, or loss of licenses or registrations that would damage our reputation, and negatively impact our earnings and ability to conduct some of our businesses. We are also subject to litigation arising in the ordinary course of our business and the adverse resolution of any litigation could have a significant adverse effect on our results or could give rise to significant reputational damage, which in turn could impact our future business prospects.

Our Regulatory Compliance Management Framework outlines how we manage and mitigate the regulatory compliance risks associated with failing to comply with, or adapt to, current and changing laws and regulations in the jurisdictions in which we operate.

Regulatory compliance risk includes the regulatory risks associated with financial crimes (which include, but are not limited to, money laundering, bribery, and sanctions), privacy, market conduct, consumer protection, business conduct, as well as prudential and other generally applicable non-financial requirements. Specific compliance policies, procedures and supporting frameworks have been developed to seek to manage regulatory compliance risk.

Strategic risk drivers

Strategic risk

Strategic risk is the risk that the enterprise or particular business areas will make inappropriate strategic choices, or will be unable to successfully implement selected strategies or achieve the expected benefits. Business strategy is a major driver of our risk appetite and consequently the strategic choices we make in terms of business mix determine how our risk profile changes.

Responsibility for selecting and successfully implementing business strategies is mandated to the individual heads of each business segment. Oversight of strategic risk is the responsibility of the heads of the business segments and their operating committees, the Enterprise Strategy & Transformation group, the GE, and the Board. The Enterprise Strategy & Transformation group supports the management of strategic risk through the strategic planning process, articulated within our Enterprise Strategic Planning Policy, ensuring alignment across our business, financial, capital and risk planning.

Our annual business portfolio review and project approval request processes help to identify and mitigate strategic risk by seeking to ensure that strategies for new initiatives, lines of business, and the enterprise as a whole align with our risk appetite and risk posture. GRM provides oversight of strategic risk by providing independent reviews of these processes, establishing enterprise risk frameworks, and independently monitoring and reporting on the level of risk established against our risk appetite metrics in accordance with the three lines of defence governance model.

For details on the key strategic priorities for our business segments, refer to the Business segment results section.

Reputation risk

Reputation risk is the risk of an adverse impact on stakeholders' perception of the bank due to i) the actions or inactions of the bank, its employees, third-party service providers, or clients, ii) the perceived misalignment of these actions or inactions with stakeholder expectations of the bank, or iii) negative public sentiment towards a global or industry issue. Our reputation is rooted in the perception of our stakeholders, and the trust and loyalty they place in us is core to our Purpose of helping clients thrive and communities prosper. A strong and trustworthy reputation will generally strengthen our market position, reduce the cost of capital, increase shareholder value, strengthen our resiliency, and help attract and retain top talent. Conversely, damage to our reputation can result in reduced share price and market capitalization, increased cost of capital, loss of strategic flexibility, inability to enter or expand into markets, loss of client loyalty and business, regulatory fines and penalties, restrictive agreements with regulators or prosecutors, or criminal prosecutions. The sources of reputation risk are widespread. Reputation risk is a transverse risk which can manifest as an outcome of other risk types including but not limited to credit, regulatory, legal, operational, and environmental and social risks. We can also experience reputation risk from a failure to maintain an effective control environment, exhibit good conduct and maintain appropriate culture practices.

Managing our reputation risk is an integral part of our organizational culture and our overall enterprise risk management approach, as well as a priority for employees and our Board. Our Board-approved Reputation Risk Management Framework

provides an overview of our approach to identify, assess, manage, monitor and report on reputation risk. This framework outlines governance authorities, roles and responsibilities, and controls and mechanisms to manage our reputation risk, including our culture of integrity, compliance with our Code of Conduct and operating within our risk appetite.

Our governance of reputation risk aims to be holistic and provides an integrated view of potential reputation issues across the organization. This governance structure is designed to ensure that ownership and accountability for reputation risk are understood across the enterprise, both proactive and reactive reputation risk decisions are escalated to senior management for review and evaluation, and reporting on reputation risk is comprehensive and integrated.

Legal and regulatory environment risk

Legal and regulatory environment risk is the risk that new or modified laws and regulations, and the interpretation or application of laws and regulations, will negatively impact the way in which we operate, both in Canada and in the other jurisdictions in which we conduct business. The full impact of some of these changes on our business will not be known until final rules are implemented and market practices have developed in response. We continue to respond to these and other developments and are working to minimize any potential adverse business or economic impact. The following provides a high-level summary of some of the key regulatory changes that have potential to increase or decrease our costs, impact our profitability and increase the complexity of our operations.

Global uncertainty

Significant uncertainty about inflationary and trade pressures, geopolitical tensions and supply chain disruptions all pose risks to the global economic outlook. In October 2022, the International Monetary Fund (IMF) projected global growth of 3.2% in calendar 2022 which remains unchanged from its July forecast. The October 2022 forecast is down from 4.9% in October 2021 and reflects the ongoing economic effects of inflationary pressures and tightening monetary policy, a worse-than-anticipated slowdown in China resulting from COVID-19 containment measures, and the ongoing conflict between Russia and Ukraine. While the outcome of the conflict between Russia and Ukraine remains uncertain, our exposure to Russia and Ukraine is extremely limited, as we do not have operations in these countries, consistent with our strategy and risk appetite. Our diversified business model, as well as our product and geographic diversification, continue to help mitigate the risks posed by global uncertainty.

Government of Canada Budget 2022

On April 7, 2022, the Government of Canada presented its 2022 budget, which included measures focused on ensuring banking and life insurers' groups help pay a portion of the costs of the Canadian federal government's COVID-19 pandemic response. On November 22, 2022, Bill C-32, Fall Economic Statement Implementation Act, 2022 (the Bill) received second reading in the House of Commons. The Bill includes a Canada Recovery Dividend (CRD) and a permanent increase in the corporate income tax rate. The CRD is a one-time 15% tax for 2022 determined based on the average taxable income above $1 billion for taxation years 2020 and 2021 and payable in equal installments over five years. The permanent increase in the corporate income tax rate is 1.5% on taxable income above $100 million and would apply to taxation years that end after April 7, 2022.

The Bill is not yet substantively enacted and timing of enactment remains uncertain.Based on the draft legislation, which remains subject to amendments prior to enactment, the CRD is expected to reduce net income by approximately $1 billion and other comprehensive income by approximately $0.1 billion when substantively enacted. The CRD is also expected to reduce our CET1 ratio by approximately 20 bps.

Climate-related regulatory activity

Climate change regulations, frameworks, and guidance that apply to banks, insurers and asset managers are rapidly evolving. We continue to monitor the development of applicable laws in this area and the evolution of disclosure requirements for public issuers. In Canada this includes OSFI's Draft Guideline B-15 Climate Risk Management, which encompasses both climate risk management guidance and disclosure requirements that, if approved, would apply to RBC for fiscal 2023 at the earliest, and the Canadian Securities Administrators' proposed National Instrument 51-107 on disclosure of climate-related matters which would introduce climate-related disclosure requirements for Canadian reporting issuers. In the U.S., the SEC has proposed rule changes which would require many registrants to include certain climate-related disclosures in their regulatory filings, including the financial statements. Internationally, the European Parliament recently approved the Corporate Sustainability Reporting Directive which will require disclosure under the European Sustainability Reporting Standards, and the International Sustainability Standards Board has also proposed standards for climate-related disclosures and general sustainability related disclosures.

Canadian Housing Market and Consumer Debt

In June 2022, OSFI released a new Advisory - Clarification on the Treatment of Innovative Real Estate Secured Lending Products under Guideline B-20 (the Advisory). The Advisory complements existing expectations under Guideline B-20 – Residential Mortgage Underwriting Practices and Procedures, which articulates OSFI's expectations regarding underwriting practices and procedures for reverse residential mortgages, residential mortgages with shared equity features and combined loan plans (CLPs). We do not originate reverse residential mortgages or residential mortgages with shared equity features, but we do originate CLPs through our RBC Homeline Plan® products. The Advisory is not expected to have an effect on how most borrowers with CLPs use their products.

The Advisory will come into effect for us on October 31, 2023. New CLPs originated after this date will need to meet the new requirements. CLPs originated before October 31, 2023 are not subject to the new requirements unless certain contractual changes are made that would trigger application of the requirements. We have assessed the requirements and initiated a project to meet the requirements by the effective date.

Interest rate benchmark reform

On May 16, 2022, Refinitiv Benchmark Services (UK) Limited (RBSL), the administrator of the Canadian Dollar Offered Rate (CDOR), announced that the calculation and publication of all remaining tenors of CDOR will permanently cease after June 28, 2024. Concurrently, OSFI published their expectation that federally regulated financial institutions (FRFIs) transition all new derivatives and securities to an alternative benchmark rate by June 30, 2023, with no new CDOR exposure after that date, with

limited exceptions for risk management requirements. Furthermore, OSFI also expects all loan agreements referencing CDOR to be transitioned by June 28, 2024. The cessation of CDOR will be managed within our enterprise-wide interest rate benchmark reform program.

For further details, refer to Note 2 of our 2022 Annual Consolidated Financial Statements.

U.S. regulatory initiatives

On September 29, 2022, the U.S. Department of the Treasury's Financial Crimes Enforcement Network (FinCEN) issued a final rule implementing the beneficial ownership information reporting requirements of the Corporate Transparency Act, which was part of the Anti- Money Laundering Act of 2020 (AMLA). The AMLA made significant revisions to the U.S.'s anti-money laundering/anti-terrorist financing compliance framework, including by requiring FinCEN to issue the final rule. The final rule implements sweeping beneficial ownership disclosure requirements applicable to U.S. companies (excluding trusts) and foreign companies doing business in the U.S., in each case subject to certain exceptions. The final rule goes into effect January 1, 2024. As part of these broad changes to the U.S. AML regulatory regime, FinCEN has stated that it plans to update its Customer Due Diligence rule, which requires covered financial institutions to identify and verify the beneficial owners of legal entity customers. We are currently assessing the impact of the final rule and do not anticipate any issues in complying with the requirements.

Technology and cyber risk management

In July 2022, OSFI released final Guideline B-13 – Technology and Cyber Risk Management, which sets out expectations for the sound management of technology and cyber risk for FRFIs.

This guideline will be effective on January 1, 2024. We have assessed the requirements and do not anticipate any issues in complying with the requirements by the effective date.

Privacy

In June 2022, the Canadian government released Bill C-27, the Digital Charter Implementation Act, 2022, with principles focused on strengthening consumer privacy protection in Canada. The Bill introduced three new federal Acts: the Consumer Privacy Protection Act, the Personal Information and Data Protection Tribunal Act, and the Artificial Intelligence and Data Act. These new Acts aim to strengthen Canada's data privacy framework and create new regulations for responsible development and use of AI.

The Consumer Privacy Protection Act is a private sector law that will repeal and replace the current Personal Information Protection and Electronic Documents Act. The Personal Information and Data Protection Tribunal Act will establish an administrative tribunal to review decisions and impose penalties, and the Artificial Intelligence and Data Act will create a risk-based approach to regulating AI systems.

While it remains uncertain when and if Bill C-27 will be enacted, this new legislation could result in significant reforms that may impact our processes and privacy risk management practices. Our Global Privacy Program is responsible for overseeing the implementation of these evolving privacy principles in our organization.

For further details on regulatory capital and related requirements, refer to the risk and Capital management sections of this 2022 Annual Report.

Competitive risk

Competitive risk is the risk of an inability to build or maintain a sustainable competitive advantage in a given market or markets, and includes the potential for loss of market share due to competitors offering superior products and services. Competitive risk can arise within or outside the financial sector, from traditional or non-traditional competitors, domestically or globally. There is intense competition for clients among financial services companies in the markets in which we operate. Client loyalty and retention can be influenced by a number of factors, including new technology used or services offered by our competitors, relative service levels and prices, product and service attributes, our reputation, actions taken by our competitors, and adherence with competition and anti-trust laws. Other companies, such as insurance companies and non-financial companies, as well as new technological applications, are increasingly offering services traditionally provided by banks. This competition could also reduce our revenue which could adversely affect our results.

We identify and assess competitive risks as part of our overall risk management process. Our products and services are regularly benchmarked against existing and potential competitors. In addition, we regularly conduct risk reviews of our products, services, mergers and acquisitions strategy, as well as we seek to ensure adherence to competition and anti-trust laws. Our annual strategy-setting process also plays an integral role in managing competitive risk.

Macroeconomic risk drivers

Systemic risk

Systemic risk is the risk that the financial system as a whole, or a major part of it – either in an individual country, a region, or globally – is put in real and immediate danger of collapse or serious damage due to an unforeseen event causing a substantive shock to the financial system with the likelihood of material damage to the economy, and which would result in financial, reputation, legal or other risks for us.

Systemic risk is considered to be the least controllable risk facing us, leading to increased vulnerabilities as experienced during the 2008 global financial crisis and the COVID-19 pandemic. Our ability to mitigate systemic risk when undertaking business activities is limited, other than through collaborative mechanisms between key industry participants, and, as appropriate, the public sector and regulators to reduce the frequency and impact of these risks. The two most significant measures in mitigating the impact of systemic risk are diversification and stress testing.

Our diversified business model, portfolios, products, activities and funding sources help mitigate the potential impacts from systemic risk as well as having established risk limits to ensure our portfolio is diversified, and concentration risk is reduced and remains within our risk appetite.

Stress testing involves consideration of the simultaneous movements in a number of risk factors. It is used to ensure our business strategies and capital planning are robust by measuring the potential impacts of credit, market, liquidity, and

operational risks on us, under adverse economic conditions. Our enterprise-wide stress testing program evaluates the potential effects of a set of specified changes in risk factors, corresponding to exceptional but plausible adverse economic and financial market events. These stress scenarios are evaluated across the organization, and results are integrated to develop an enterprise-wide view of the impacts on our financial results and capital requirements. For further details on our stress testing, refer to the Enterprise risk management section.

Our financial results are affected by the business and economic conditions in the geographic regions in which we operate. These conditions include consumer saving and spending habits as well as consumer borrowing and repayment patterns, business investment, government spending, exchange rates, sovereign debt risks, the level of activity and volatility of the capital markets, strength of the economy and inflation. Given the importance of our Canadian and U.S. operations, an economic downturn may largely affect our personal and business lending activities and may result in higher provisions for credit losses. Deterioration and uncertainty in global capital markets could result in continued high volatility that would impact results in Capital Markets, while in Wealth Management weaker market conditions could lead to lower average fee-based client assets and transaction volumes. In addition, worsening financial and credit market conditions may adversely affect our ability to access capital markets on favourable terms and could negatively affect our liquidity, resulting in increased funding costs and lower transaction volumes in Capital Markets and Investor & Treasury Services.

Our financial results are also sensitive to changes in interest rates. To address growing inflation pressures, major central banks started to increase benchmark interest rates in early fiscal 2022 and further increases are expected. While our NIM can potentially benefit from rate increases, rising interest rates, coupled with elevated inflation, could increase market volatility and reduce asset values, and could adversely impact household and corporate balance sheets. This could lead to credit deterioration and impact our financial results, particularly in our Personal & Commercial Banking, Wealth Management, and Capital Markets businesses.

Overview of other risks

In addition to the risks described in the risk sections, there are other risk factors, described below, which may affect our businesses and financial results. The following discussion is not exhaustive as other factors could also adversely affect our results.

Government fiscal, monetary and other policies

Our businesses and earnings are affected by monetary policies that are adopted by the BoC, the Fed in the U.S., the ECB in the European Union (EU), the BoE in the U.K. and monetary authorities in other jurisdictions in which we operate, as well as the fiscal policies of the governments of Canada, the U.S., the U.K., Europe and such other jurisdictions. Such policies can also adversely affect our clients and counterparties in Canada, the U.S. and internationally, which may increase the risk of default by such clients and counterparties.

Tax risk and transparency

Tax risk refers to the risk of loss related to unexpected tax liabilities. The tax laws and systems that are applicable to us are complex and wide-ranging. As a result, we seek to ensure that any decisions or actions related to tax always reflect our assessment of the long-term costs and risks involved, including their impact on our reputation and our relationship with clients, shareholders, and regulators.

Our approach to taxation is grounded in principles which are reflected in our Code of Conduct, is governed by our Enterprise Tax Risk Management Policy, and incorporates the fundamentals of our risk drivers. Oversight of our tax policy and the management of tax risk is the responsibility of the GE, the CFO and the Senior Vice President, Taxation. We discuss our tax strategy with the Audit Committee annually and provide updates on our tax position on a regular basis.

Our tax strategy is designed to provide transparency and support our business strategy, and is aligned with our corporate vision and values. We seek to maximize shareholder value by structuring our businesses in a tax-efficient manner while considering reputation risk by being in compliance with all laws and regulations. Our policy requires that we:

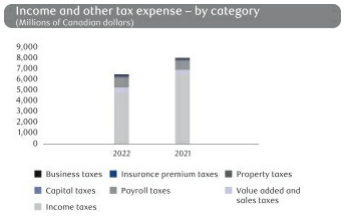
- Act with integrity and in a straightforward, open and honest manner in all tax matters;
- Ensure tax strategy is aligned with our business strategy supporting only bona fide transactions with a business purpose and economic substance;
- Ensure all intercompany transactions are conducted in accordance with applicable transfer pricing requirements;
- Ensure our full compliance and full disclosure to tax authorities of our statutory obligations; and
- Endeavour to work with the tax authorities to build positive long-term relationships and where disputes occur, address them constructively.

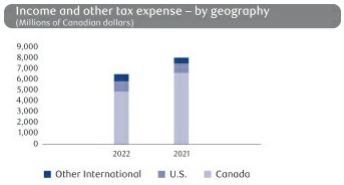
With respect to assessing the needs of our clients, we consider a number of factors including the purpose of the transactions. We seek to ensure that we only support bona fide client transactions with a business purpose and economic substance. Should we become aware of client transactions that are aimed at evading their tax obligations, we will not proceed with the transactions.

We operate in 29 countries worldwide. Our activities in these countries are subject to both Canadian and international tax legislation and other regulations, and are fully disclosed to the relevant tax authorities. The Taxation group and GRM both regularly review the activities of all entities in an effort to ensure compliance with tax requirements and other regulations.

Given that we operate globally, complex tax legislation and accounting principles have resulted in differing legal interpretations between the respective tax authorities we deal with and ourselves, and we are at risk of tax authorities disagreeing with prior positions we have taken for tax purposes. When this occurs, we are committed to an open and transparent dialogue with the tax authorities to facilitate a quick assessment and prompt resolution of the issues where possible. Failure to adequately manage tax risk and resolve issues with tax authorities in a satisfactory manner could adversely impact our results, potentially to a material extent in a particular period, and/or significantly impact our reputation.

Tax contribution
In 2022, total income and other tax expense, including income taxes in the Consolidated Statements of Comprehensive Income and Changes in Equity, to various levels of governments globally totalled $6 billion (2021 – $8 billion). In Canada, total income and other tax expense for the year ended October 31, 2022 to various levels of government totalled $5 billion (2021 – $7 billion).





For further details on income and other tax expense, refer to the Financial performance section.

Environmental and social risk (including climate change)

Environmental and Social (E&S) risk is the potential for an E&S issue associated with us, a client, transaction, product, supplier or activity, to have a negative impact on our financial position, operations, legal and regulatory compliance, or reputation. It refers to the risk that we face as a result of the manner in which we, a supplier or a client manages E&S issues or relationships with stakeholders and communities.

E&S issues include, but are not limited to, site contamination, waste management, land and resource use, biodiversity, water quality and availability, climate change, environmental regulation, human rights (including, but not limited to social and racial inequality and Indigenous Peoples' rights), and community engagement.

E&S risks, including climate change, are each unique and transverse risks impacting our principal risk types in different ways and to varying degrees. While E&S risk manifests itself through credit, reputation, and regulatory compliance risks, the impact of E&S risk also extends to our other principal risks, including systemic, competitive, strategic, legal and regulatory environment, operational, market, liquidity and insurance risks.

The following sets out our governance and risk management in respect of environmental and social risks more broadly; see the Climate risk section below for additional information specific to climate risk.

E&S risk – governance
The Board oversees how we manage our E&S risks, our enterprise approach to E&S risks, and how we conduct our business to meet high standards of E&S responsibility. The Committees of the Board have oversight of E&S risks that are specific to their respective responsibilities, with the Governance Committee playing a specific oversight and coordination role over ESG matters, including certain of our ESG disclosures. For further details on risk governance, refer to the Enterprise risk management – Risk governance section and the Climate risk – Governance section.

Senior management is responsible for managing E&S risks and opportunities, which include climate change, and implementing our enterprise strategies for E&S matters.

E&S risk – risk management
Roles and responsibilities related to E&S risk management are governed by the three lines of defence governance model and the Enterprise Risk Management Framework.

The E&S Risk team within GRM is responsible for identifying, assessing, measuring, managing, mitigating, monitoring and reporting E&S issues that may pose a risk to the bank, and for developing and maintaining policies on a regular basis to manage E&S risk. Business segments and functional areas are responsible for incorporating E&S risk management requirements within their operations. A bottom-up approach is taken to identifying E&S risk at the client, transaction, and supplier level, as well as when evaluating business strategies, acquisitions, projects/initiatives, products, or services. A top-down approach is also taken to identifying and monitoring evolving E&S risks by monitoring E&S risk in various businesses, portfolios and geographies.

Our Enterprise Policy on Environmental (including Climate) and Social Risk (E&S Risk Policy) serves as the foundation for our approach to managing E&S risks arising from our activities. It outlines our principles for E&S risk management, as well as the minimum requirements on how E&S risks arising from our activities are identified, assessed, measured, managed, mitigated, monitored and reported. The E&S Risk Policy also requires that clients operating in industries of elevated environmental risk be subjected to an environmental and social review. The E&S Risk Policy is supported by additional policies and procedures on E&S risk management for business segments. We also have policy guidelines in place for sensitive sectors and activities, which address our financing activities to clients and projects operating in the coal-fired power and coal mining sectors, the Arctic ecosystem, the Arctic National Wildlife Refuge, and United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites.

Our E&S Risk Policy also sets the minimum requirement for how we identify, assess, manage, and mitigate human rights issues, and is supported by additional polices and position statements that reflect our approach to managing our businesses in a responsible manner.

Our Code of Conduct establishes standards of desired behaviours that apply to all directors, employees, and contract workers of the bank and its subsidiaries. In addition, our principles-based Supplier Code of Conduct articulates our expectations with respect to a supplier's business integrity, responsible business practices and responsible treatment of individuals and the environment.

Our published Human Rights Position Statement sets out our commitment to respect internationally-recognized human rights in line with the United Nations Guiding Principles on Business and Human Rights. In addition, our Modern Slavery Act Statement, which is published annually, sets out the policies and processes that are designed to prevent slavery and human trafficking from taking place in our operations and supply chains.

We are a participant or signatory to various industry principles and initiatives that are designed to help mitigate E&S risk within our business activities or advance responsible business practices, including, but not limited to the following:

- The bank is a signatory to the Equator Principles (EP), which is a benchmark for determining, assessing and managing E&S risks for project finance. We report annually on projects assessed according to the EP framework.
- RBC GAM[1], BlueBay Asset Management LLP and Brewin Dolphin Holdings Limited are signatories to the United Nations Principles for Responsible Investment (UN PRI) and report annually on their responsible investment activities to the UN PRI.

Climate risk

Climate risk is the risk related to the global transition to a net-zero economy (transition risk) and the physical impacts of climate change (physical risk), which includes both chronic (longer-term) and acute (event driven) risks. We may be exposed to transition risk including through emerging regulatory and legal requirements changing business and consumer sentiments towards and the products and services we provide to our clients. Both we and our clients may also be exposed to transition risk through technological and societal change and market forces. Additionally, we and our clients may also be vulnerable to physical risk including through disruptions to operations and services.

The following section is informed by the pillars of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD).

Climate risk – governance

The Board provides oversight of the bank's strategic approach to climate change, which includes how we manage climate-related risks and opportunities. The Board approved our updated climate strategy, the RBC Climate Blueprint, which was published in February 2022, and engaged with management on a range of climate-related topics including the measurement of financed emissions, scenario analysis, and our initial interim emissions reduction targets. The Committees of the Board also engaged with management on climate-related issues, which included emerging perspectives in Board oversight of ESG including climate, the increased regulatory and stakeholder focus, and further incorporation of climate risks in risk appetite, risk management frameworks and enterprise-wide stress testing.

GE is responsible for implementing the RBC Climate Blueprint. Responsibility for climate is incorporated into our management structure and business models throughout the enterprise, and key businesses have an executive with responsibility for climate change and are configured to address the sustainable financing, investment and client needs associated with the net-zero transition as applicable to their business. Since 2021, we have had a Climate Strategy Steering Committee which includes executive representation from Capital Markets, Wealth Management, GAM[1], Personal & Commercial Banking, GRM and Corporate Communications, and a Climate Strategy and Governance team which provides enterprise-wide strategic direction on advancing our understanding and developing strategies to address climate-related risks and opportunities for us and our clients.

[1] RBC GAM includes the following affiliates: BlueBay Asset Management LLP (BlueBay), RBC Global Asset Management Inc. (including Phillips, Hager & North Investment Management), RBC Global Asset Management (U.S.) Inc., RBC Global Asset Management (UK) Limited, and RBC Global Asset Management (Asia) Limited, which are separate, but affiliated subsidiaries of RBC.

Climate risk – strategy

We recognize we have a role to play in accelerating the transition to a net-zero economy and mitigating the risks associated with climate change. Our climate strategy is underpinned by our belief that the transition to net-zero should be just, orderly and inclusive. The RBC Climate Blueprint outlines our strategic climate priorities, including helping our clients as they transition to a net-zero future and holding ourselves accountable to achieve net-zero in our lending by 2050. RBC GAM has an approach to climate change that supports the RBC Climate Blueprint and lays out its commitments and actions related to climate change.

In 2021, we made a commitment to provide $500 billion in sustainable financing by 2025[2]. In October 2022, we published our approach and methodology for classifying, tracking, and disclosing progress towards our sustainable finance commitment and to support the identification of new growth opportunities for our clients and our business. Financing activities that help to address environmental issues are included as one aspect of sustainable finance. Our commitment to sustainable finance therefore allows us to build on our support for the growth of the green bond market through our issuance of green bonds under our Sustainable Bond Framework. In addition, RBC Europe Limited (RBCEL), a wholly owned subsidiary of the bank, is a member of the Green Bond Principles, and RBC reports annually on its green bond underwriting activities, globally. We also provide products, services and client solutions across our business segments to help businesses and individuals accelerate their climate goals and overcome barriers for adoption.

RBC is a member of the Net-Zero Banking Alliance (NZBA), which is a global industry-led initiative to accelerate and support efforts to address climate change by aligning member banks' lending and investment portfolios with net-zero emissions by 2050[3]. We are also a member of the Partnership for Carbon Accounting Financials (PCAF), which is an industry-led partnership to facilitate transparency and enable financial institutions to assess and disclose greenhouse gas emissions of loans and investments. As a member of the NZBA, we made a commitment to setting and disclosing interim emissions reduction targets for certain of our key high-emitting sectors. In March 2022, we published our initial measurement of financed emissions using the PCAF methodology, and in October 2022, in accordance with our NZBA commitment, we published our initial interim emissions reduction targets for the oil and gas, power generation and automotive sectors[3].

Our ability to achieve our climate and sustainable finance-related commitments, goals and targets, including those discussed above, will depend on the collective efforts and actions across a wide range of stakeholders outside of our control, and there can be no assurance that they will be achieved[4].

Climate risk – risk management

We regard climate risk as a transverse risk, which impacts all of our principal risk types in different ways and to varying degrees, and requires us to consider how financial and non-financial factors may impact us and our clients.

Global practices in the identification, assessment, measurement and management of climate risks and opportunities are rapidly evolving. We are continuing to advance our climate risk measurement, management, monitoring and reporting capabilities and to advance our understanding of the impact climate-related risks may have on our business and our clients' businesses. In particular:

- We conduct portfolio, client and scenario analyses to assess our exposure to, and the impact of, climate-related risks.
- We continue to refine our climate risk appetite and, as noted above, we have published initial interim emissions reduction targets for certain key high-emitting sectors in connection with our goal to achieve net-zero emissions in our lending by 2050.
- As part of our annual stress testing and analysis, we continue to integrate components of climate risk through transition and physical risk stresses and assess its impact on our key portfolios.
- We seek to improve data quality to further identify those sectors within our wholesale portfolio that are most affected by physical and transition risk, which allows us to better focus ongoing monitoring of climate risk.
- We are expanding our climate data inventory and enhancing our data governance processes to improve our climate risk analytical capabilities.

---

[2] Sustainable finance refers to financial activities that take into account environmental, social and governance factors.

[3] Our NZBA commitment, our initial measurement of financed emissions and our initial interim emissions reduction targets exclude the practices of: (a) RBC GAM and RBC Wealth Management. RBC Wealth Management includes the following affiliates: RBC Dominion Securities Inc. (Member – Canadian Investor Protection Fund), RBC Direct Investing Inc. (Member–Canadian Investor Protection Fund), Royal Mutual Funds Inc., RBC Wealth Management Financial Services Inc., Royal Trust Corporation of Canada and The Royal Trust Company, which are separate but affiliated subsidiaries of RBC; and (b) Brewin Dolphin Holdings PLC and its subsidiaries.

[4] External factors that could cause our actual results to differ materially from our expectations expressed in such commitments, goals and targets include the need for more and better climate data and standardization of climate-related measurement methodologies, our ability to gather and verify data, our ability to successfully implement various initiatives throughout our enterprise under expected time frames, difficulty in identifying transactions, products and services that meet the sustainable finance classification criteria, the risk that eligible transactions or related initiatives will not be completed within any specified period or at all or with the results or outcome as originally expected or anticipated by us, our ability to track transactions and report on them as performance against our climate or sustainable finance commitment, the compliance of various third parties with our policies and procedures and their commitment to us, the need for active and continuing participation and action of various stakeholders, technological advancements, the evolution of consumer behaviour, varying decarbonization efforts across economies, the need for thoughtful climate policies around the world, the challenges of balancing emission reduction targets with an orderly, just and inclusive transition and geopolitical factors that impact global energy needs, the legal and regulatory environment, and regulatory compliance considerations. Our climate- or sustainable finance-related commitments, goals and targets are aspirational and may need to be changed or recalibrated as data improve and as climate science, transition pathways and market practices regarding standards, methodologies, metrics and measurements evolve.

As with risk appetite, our continued development of our climate risk measurement capabilities will inform the steps we take to further the implementation of climate-related risk limits and advance the integration of climate risks into our policies and procedures.

In addition, we regularly review the risks that we face and reflect on those that affect our clients. We also continue to explore opportunities to expand the products and services we provide to respond to the evolving ESG landscape, help our clients navigate their transition to a net-zero economy, and advance their sustainability strategies:

Emerging regulatory and legal requirements	• Climate change regulations, frameworks, and guidance that apply to banks, insurers and asset managers are rapidly evolving. Several central banks and regulators have taken steps to introduce or have already introduced rules to address the financial and economic risks of climate change. As regulations and formal requirements evolve, we will continue to monitor such developments and update our risk management practices and disclosures as necessary. See the Legal and regulatory environment risk section for further details.
Disruptions to operations and client services	• We identify properties that we lease or own, which contain business processes and supporting applications that require enhanced facility infrastructure to mitigate site disruptions, such as those caused by extreme weather events. We classify critical environment sites based on our business risk tolerance for site-specific downtime and, among other things, site location, power supply, exposure to flooding, geological stability and other hazards. • We take steps to mitigate and adapt to climate change through our building design and our purchasing decisions. • As required, we assess the impact of climate-related events (e.g., floods, hurricanes) on our businesses and client operations.
Products and services we provide	• We maintain a diversified lending portfolio, which improves our resilience to geographic or sectoral downturns and limits concentrations of credit exposure to climate risk. • Each business segment is responsible for identifying material climate-related risks and opportunities, which are integrated into risk management processes as necessary. • We continue to deliver advice and solutions to our clients to support their transition to a net-zero economy and the advancement of their sustainability strategies. For example, we provide sustainable finance products such as green, social and sustainability bond underwriting, sustainability-linked bonds and loans, as well as advisory services to integrate ESG factors for companies that are in the pre-initial public offering or pre-acquisition stage. Our offerings also include ESG-integrated investment solutions, structured products, carbon trading services, and ESG research and thought leadership. While we finance sectors across the economy, we are working to accelerate sustainable finance and to provide ESG advisory services to clients, inclusive of energy transition opportunities. • RBC GAM integrates material ESG factors in its investment processes for applicable investment strategies to help mitigate risk and/or enhance long-term, risk-adjusted returns. • RBC Insurance® (through its insurance agency) sells property and casualty insurance products that are underwritten and insured by Aviva Canada Inc. As such, RBC Insurance is not directly exposed to climate-related risks associated with these products. The property and casualty insurance industry as a whole has exposure to longer-term shifts in climate patterns and extreme weather events, which may indirectly impact our Insurance business results. We are continuing to advance our understanding of the impact of acute and longer term weather events on travel insurance, and for life and health insurance products sold to group/business clients. • Our Personal & Commercial Banking businesses continue to provide products to support clients in the net-zero transition, including financing for hybrid and electric vehicles, home energy retrofit financing, ESG market-linked GICs and advisory and lending solutions for clean technology.

Climate risk – metrics & targets

We report annually on environmental performance metrics, including metrics for the value of sustainable financing, environmental philanthropy through RBC Tech for Nature, financed emissions, and emissions reduction in our own operations. We also published our initial interim emissions reduction targets for certain key high-emitting sectors in October 2022.

Capital management

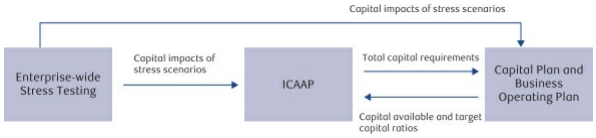
We actively manage our capital to maintain strong capital ratios and high ratings while providing strong returns to our shareholders. In addition to the regulatory requirements, we consider the expectations of credit rating agencies, depositors and shareholders, as well as our business plans, stress tests, peer comparisons and our internal capital ratio targets. Our goal is to optimize our capital usage and structure, and to provide support for our business segments and clients. We also aim to generate optimal returns for our shareholders, while protecting depositors and creditors.

Capital management framework

Our capital management framework establishes policies and processes for defining, measuring, raising and investing all forms of capital in a coordinated and consistent manner. It sets our overall approach to capital management, including guiding principles and roles and responsibilities relating to capital adequacy and transactions, dividends, solo capital, management of RWA, leverage ratio exposures, TLAC capital and TLAC leverage ratios. We manage and monitor capital from several perspectives, including regulatory capital, solo capital and TLAC.

Our capital planning process is dynamic and involves various teams including Finance, Corporate Treasury, GRM, Economics and our businesses, and covers internal capital ratio targets, potential capital transactions as well as projected dividend payouts and share repurchases. This process considers our business operating plans, enterprise-wide stress testing and ICAAP, regulatory capital changes and supervisory requirements, accounting changes, internal capital requirements, rating agency metrics and solo capital.

Our capital plan is established on an annual basis and is aligned with the management actions included in the annual business operating plan, which includes forecast growth in assets and earnings taking into account our business strategies, the projected market and economic environment, and peer positioning. This includes incorporating potential capital transactions based on our projected internal capital generation, business forecasts, market conditions and other developments, such as accounting and regulatory changes that may impact capital requirements. All of the components in the capital plan are monitored throughout the year and are revised as deemed appropriate.



Our enterprise-wide stress testing and annual ICAAP processes provide key inputs for capital planning, including setting internal capital ratio targets. The stress scenarios are evaluated across the organization, and results are integrated to develop an enterprise-wide view of financial impacts and capital requirements, which in turn facilitate the planning of mitigating actions to absorb adverse events. ICAAP assesses capital adequacy and requirements covering all material risks, with a cushion for plausible contingencies. In accordance with OSFI guidelines, major components of our ICAAP process include comprehensive risk assessment, stress testing, capital assessment and planning, Board and senior management oversight, monitoring and reporting and internal control review.

Our internal capital targets are established to maintain robust capital positions in excess of OSFI's Basel III regulatory targets. The results of our enterprise-wide stress testing and ICAAP processes are incorporated into the OSFI Capital Buffers, D-SIB/Globally Systemically Important Banks (G-SIB) surcharge, and Domestic Stability Buffer (DSB), with a view to ensure that the bank has adequate capital to underpin risks and absorb losses under all plausible stress scenarios, including situations like the recent COVID-19 pandemic, given our risk profile and appetite. In addition, we include a discretionary cushion on top of OSFI's regulatory targets to reflect our risk appetite, our forecasts of potential negative downturns and to maintain our capital strength for forthcoming regulatory and accounting changes, peer comparatives, rating agencies sensitivities and solo capital level.

The Board is responsible for the ultimate oversight of capital management, including the annual review and approval of the capital plan. ALCO and GE share responsibility for capital management and receive regular reports detailing our compliance with approved limits and guidelines. The Audit and Risk Committees jointly approve the ICAAP process.

Basel III

Our consolidated regulatory capital requirements are determined by guidelines issued by OSFI, which are based on the minimum Basel III capital ratio requirements adopted by the BCBS.

Under Basel III, banks select from two main approaches, the Standardized Approach (SA) or the IRB Approach, to calculate their minimum regulatory capital required to support credit, market and operational risks. We adopted the Basel III IRB approach to calculate credit risk capital for consolidated regulatory reporting purposes. While the majority of our credit risk exposures are reported under the Basel III IRB Approach for regulatory capital purposes, certain portfolios continue to use the Basel III SA for credit risk (for example, our Caribbean Banking operations and City National). For consolidated regulatory reporting of market risk capital, we use both the Internal Models-based and Standardized Approaches, and for consolidated regulatory reporting of operational risk capital we use the SA. We determine our regulatory leverage ratio based on OSFI's LR Guideline, which reflects the BCBS Basel III leverage ratio requirements.

All federally regulated banks with a Basel III leverage ratio total exposure exceeding €200 billion at their financial year-end are required, at a minimum, to publicly disclose in the first quarter following their year-end, the twelve indicators used in the G-SIB assessment methodology, with the goal of enhancing the transparency of the relative scale of banks' potential global systemic importance and data quality. The FSB publishes an updated list of G-SIBs annually. On November 21, 2022, we were re-designated as a G-SIB by the FSB. This designation requires us to maintain a higher loss absorbency requirement (common equity as a percentage of RWA) of 1% consistent with the D-SIB requirement.

Effective November 1, 2021, OSFI's TLAC guideline established two minimum standards: the risk-based TLAC ratio, which builds on the risk-based capital ratios described in the CAR guideline, and the TLAC leverage ratio, which builds on the leverage ratio described in OSFI's LR guideline. The TLAC requirement is intended to address the sufficiency of a D-SIB's loss absorbing capacity in supporting its recapitalization in the event of its failure. TLAC is defined as the aggregate of Tier 1 capital, Tier 2 capital, and external TLAC instruments, which allow conversion in whole or in part into common shares under the CDIC Act and meet all of the eligibility criteria under the TLAC guideline.

OSFI requires all D-SIBs to publicly disclose their Pillar 2 DSB as part of their quarterly disclosures, similar to other current capital-related disclosure requirements. The level of the Pillar 2 buffer ranges between 0% and 2.5% of the entity's total RWA for each of the six systemically important banks in Canada. The DSB requirements must be met at the CET1 capital level. OSFI undertakes a review of the DSB on a semi-annual basis, in June and December, and will publicly announce any changes at that time. On June 17, 2021, OSFI announced an increase in the DSB from 1.0% to 2.5% of total RWA effective October 31, 2021 and reaffirmed this DSB level on June 22, 2022. The 2.5% continues to reflect the highest DSB requirement under OSFI capital requirements.

In Q2 2020, OSFI announced a series of regulatory adjustments and guidance to support the financial and operational resilience of the banking sector in response to the COVID-19 pandemic, and continues, as needed, to release regulations implementing, clarifying, updating or unwinding certain aspects or requirements. Such measures and guidance include:

- Modifications for increases in expected credit loss provisions on CET1 capital by applying a 25% after-tax exclusion rate for growth in Stage 1 and Stage 2 allowances between Q1 2020 and the respective quarters of fiscal 2022. The exclusion rate was reduced to the current 25% in fiscal 2022 from 50% in fiscal 2021, and will cease to apply at the beginning of fiscal 2023. These modifications are not available for a financial institution's IRB portfolio in any quarter in which the financial institution has a shortfall in allowances.
- Exclusion of central bank reserves and sovereign-issued securities that qualify as HQLA from leverage ratio exposure amounts until December 31, 2021. On August 12, 2021, OSFI announced that the exclusion of sovereign-issued securities that qualify as HQLA from the leverage ratio exposure measure will not extend beyond December 31, 2021 and that central bank reserves will continue to be excluded from the leverage ratio exposure measure. On September 13, 2022, OSFI announced that exclusion of these central bank reserves from the leverage ratio will cease effective April 1, 2023.
- Reduction in the current regulatory capital floor for financial institutions using the IRB approach from 75% to 70% of RWA under the SA. The reduced floor factor will remain in place until the adoption of the Basel III reforms in Q2 2023.
- Clarification of the applicable capital and leverage ratio treatment of certain government relief programs.

OSFI has assessed and will continue to assess the need for these relief measures. We have incorporated the above adjustments and guidance, as applicable, into our results and in our ongoing capital planning activities.

The following table provides a summary of OSFI's current regulatory target ratios under Basel III and Pillar 2 requirements. We are in compliance with all current capital, leverage and TLAC requirements imposed by OSFI:

Basel III – OSFI regulatory targets **Table 64**

Basel III capital and leverage ratios	OSFI regulatory target requirements for large banks under Basel III					RBC capital and leverage ratios as at October 31, 2022	Domestic Stability Buffer (3)	Minimum including Capital Buffers, D-SIB/G-SIB surcharge and Domestic Stability Buffer as at October 31, 2022
	Minimum	Capital Buffers (1)	Minimum including Capital Buffers	D-SIB/G-SIB surcharge (2)	Minimum including Capital Buffers and D-SIB/G-SIB surcharge (2)			
Common Equity Tier 1	4.5%	2.5%	7.0%	1.0%	8.0%	12.6%	2.5%	10.5%
Tier 1 capital	6.0%	2.5%	8.5%	1.0%	9.5%	13.8%	2.5%	12.0%
Total capital	8.0%	2.5%	10.5%	1.0%	11.5%	15.4%	2.5%	14.0%
Leverage ratio	3.0%	n.a.	3.0%	n.a.	3.0%	4.4%	n.a.	3.0%
TLAC ratio (4)	21.5%	n.a.	21.5%	n.a.	21.5%	26.4%	2.5%	24.0%
TLAC leverage ratio (4)	6.75%	n.a.	6.75%	n.a.	6.75%	8.5%	n.a.	6.75%

(1) The capital buffers include the capital conservation buffer and the countercyclical capital buffer as prescribed by OSFI.

(2) A capital surcharge, equal to the higher of our D-SIB surcharge and the BCBS's G-SIB surcharge, is applicable to risk-weighted capital.

(3) The Domestic Stability Buffer can range from 0% to 2.5% of total RWA and is currently set at 2.5%, reaffirmed by OSFI on June 22, 2022.

(4) Effective November 1, 2021, OSFI requires D-SIBs to meet minimum risk-based TLAC ratio and TLAC leverage ratio requirements which are calculated using OSFI's TLAC guideline.

n.a. not applicable

Regulatory capital, TLAC available, RWA, capital and TLAC ratios

Under Basel III, capital consists of CET1, Additional Tier 1, Tier 2 capital, and external TLAC instruments.

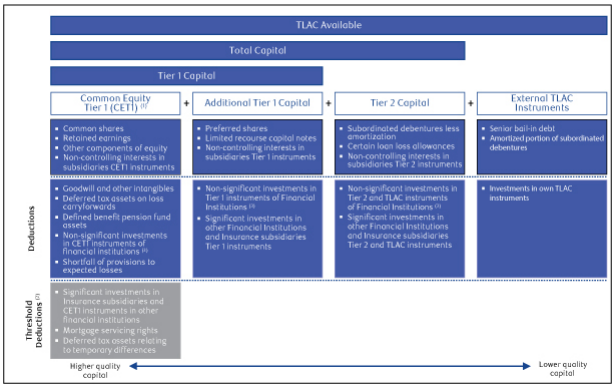
CET1 capital comprises the highest quality of capital. Regulatory adjustments under Basel III include full deductions of certain items and additional capital components that are subject to threshold deductions.

Tier 1 capital comprises predominantly CET1 and Additional Tier 1 items including non-cumulative preferred shares and limited recourse capital notes (LRCNs) that meet certain criteria. Tier 2 capital primarily includes subordinated debentures that meet certain criteria and certain loan loss allowances. Total capital is defined as the sum of Tier 1 and Tier 2 capital. Preferred shares, LRCNs, and subordinated debentures issued after January 1, 2013 require Non-viability contingent capital (NVCC) features to be included into regulatory capital. NVCC requirements ensure that non-common regulatory capital instruments bear losses before banks seek government funding.

TLAC available is defined as the sum of Total capital and external TLAC instruments. External TLAC instruments comprise predominantly senior bail-in debt, which includes eligible senior unsecured debt with an original term to maturity of greater than 400 days and remaining term to maturity of greater than 365 days.

Capital ratios are calculated by dividing CET1, Tier 1, Total capital and TLAC available by total RWA.

The following chart provides a summary of the major components of CET1, Additional Tier 1, Tier 2 capital and external TLAC instruments.



(1) In accordance with OSFI's regulatory adjustments announced in Q2 2020, and as discussed above, this includes capital modifications associated with Stage 1 and 2 allowances which were subject to a 25% after-tax exclusion rate in fiscal 2022, and 50% in fiscal 2021. This guidance will cease to apply at the beginning of fiscal 2023.

(2) First level: The amount by which each of the items exceeds a 10% threshold of CET1 capital (after all deductions but before threshold deductions) will be deducted from CET1 capital. Second level: The aggregate amount of the three items not deducted from the first level above and in excess of 15% of CET1 capital after regulatory adjustments will be deducted from capital, and the remaining balance not deducted will be risk-weighted at 250%.

(3) Non-significant investments are subject to certain CAR criteria that drive the amount eligible for deduction.

The following tables provide details on our regulatory capital, TLAC available, RWA, and on ratios for capital, leverage and TLAC. Our capital position remains strong and our capital, leverage and TLAC ratios remain well above OSFI regulatory targets:

Regulatory capital, TLAC available, RWA and capital, leverage and TLAC ratios — Table 65

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	As at October 31 2022	October 31 2021
Capital (1)		
CET1 capital	**$ 76,945**	$ 75,583
Tier 1 capital	**84,242**	82,246
Total capital	**93,850**	92,026
Risk-weighted assets (RWA) used in calculation of capital ratios (1)		
Credit risk	**$ 496,898**	$ 444,142
Market risk	**35,342**	34,806
Operational risk	**77,639**	73,593
Total RWA	**$ 609,879**	$ 552,541
Capital ratios and Leverage ratio (1)		
CET1 ratio	**12.6%**	13.7%
Tier 1 capital ratio	**13.8%**	14.9%
Total capital ratio	**15.4%**	16.7%
Leverage ratio	**4.4%**	4.9%
Leverage ratio exposure (billions)	**$ 1,898**	$ 1,662
TLAC available and ratios (2), (3)		
TLAC available	**$ 160,961**	n.a.
TLAC ratio	**26.4%**	n.a.
TLAC leverage ratio	**8.5%**	n.a.

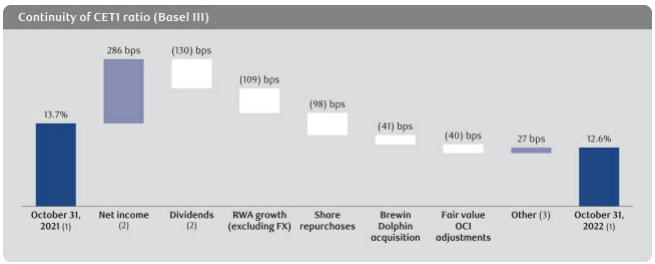
(1) Capital, RWA, and capital ratios are calculated using OSFI's CAR guideline and the Leverage ratio is calculated using OSFI's Leverage Requirements (LR) guideline as updated in accordance with the regulatory guidance issued by OSFI in response to the COVID-19 pandemic. Both the CAR guideline and LR guideline are based on the Basel III framework.
(2) Effective November 1, 2021, OSFI requires D-SIBs to meet minimum risk-based TLAC ratio and TLAC leverage ratio requirements which are calculated using OSFI's TLAC guideline.
(3) The TLAC standard is applied at the resolution entity level which for us is deemed to be Royal Bank of Canada and its subsidiaries. A resolution entity and its subsidiaries are collectively called a resolution group. Both the TLAC ratio and TLAC leverage ratio are calculated using the TLAC available as percentage of total RWA and leverage exposure, respectively.
n.a. not applicable

Regulatory capital and TLAC available — Table 66

(Millions of Canadian dollars)	As at October 31 2022	October 31 2021
CET1 capital: instruments and reserves and regulatory adjustments		
Directly issued qualifying common share capital (and equivalent for non-joint stock companies) plus related stock surplus	**$ 17,162**	$ 17,887
Retained earnings	**77,859**	71,563
Accumulated other comprehensive income (and other reserves)	**5,725**	2,533
Directly issued capital subject to phase out from CET1 (only applicable to non-joint stock companies)	**–**	–
Common share capital issued by subsidiaries and held by third parties (amount allowed in group CET1)	**11**	11
Regulatory adjustments applied to CET1 under Basel III	**(23,812)**	(16,411)
Common Equity Tier 1 capital (CET1)	**$ 76,945**	$ 75,583
Additional Tier 1 capital: instruments and regulatory adjustments		
Directly issued qualifying Additional Tier 1 instruments plus related stock surplus	**$ 7,294**	$ 6,661
Directly issued capital instruments to phase out from Additional Tier 1	**–**	–
Additional Tier 1 instruments issued by subsidiaries and held by third parties (amount allowed in group AT1)	**3**	2
Regulatory adjustments applied to Additional Tier 1 under Basel III	**–**	–
Additional Tier 1 capital (AT1)	**$ 7,297**	$ 6,663
Tier 1 capital (T1 = CET1 + AT1)	**$ 84,242**	$ 82,246
Tier 2 capital: instruments and provisions and regulatory adjustments		
Directly issued qualifying Tier 2 instruments plus related stock surplus	**$ 8,587**	$ 8,443
Directly issued capital instruments subject to phase out from Tier 2	**–**	448
Tier 2 instruments issued by subsidiaries and held by third parties (amount allowed in group Tier 2)	**3**	26
Collective allowance	**1,018**	863
Regulatory adjustments applied to Tier 2 under Basel III	**–**	–
Tier 2 capital (T2)	**$ 9,608**	$ 9,780
Total capital (T1 + T2)	**$ 93,850**	$ 92,026
External TLAC: instruments and regulatory adjustments		
External TLAC instruments	**$ 66,528**	n.a.
Amortised portion of T2 instruments where remaining maturity > 1 year	**818**	n.a.
Regulatory adjustments applied to TLAC under Basel III	**(235)**	n.a.
TLAC available (Total capital + External TLAC)	**$160,961**	n.a.

n.a. not applicable

2022 vs. 2021



(1) Represents rounded figures.
(2) Represents net internal capital generation of $9 billion or 156 bps consisting of Net income available to shareholders, less common and preferred share dividends and distributions on other equity instruments.
(3) Includes net credit migration of 14 bps, model updates of 13 bps and other movements.

Our CET1 ratio was 12.6%, down 110 bps from last year, mainly reflecting RWA growth (excluding FX), share repurchases, the impact of our Brewin Dolphin acquisition, and the unfavourable impact of fair value OCI adjustments. These factors were partially offset by net internal capital generation, favourable net credit migration and model updates.

Our Tier 1 capital ratio of 13.8% was down 110 bps, reflecting the factors noted above under the CET1 ratio and a favourable impact from the net issuance of preferred shares.

Our Total capital ratio of 15.4% was down 130 bps, reflecting the factors noted above under the Tier 1 capital ratio and a favourable impact from the net issuance of subordinated debentures.

Our Leverage ratio of 4.4% was down 50 bps, mainly reflecting share repurchases, business-driven growth in leverage exposures, lower regulatory modifications, the unfavourable impact of fair value OCI adjustments, and the impact of our Brewin Dolphin acquisition. These factors were partially offset by net internal capital generation.

Leverage exposures increased by $236 billion mainly driven by business growth in retail and wholesale loans, and undrawn commitments. The impact of foreign exchange translation and lower regulatory modifications, mainly due to the reversal of the sovereign-issued securities qualifying as HQLA, also contributed to the increase.

Our TLAC ratio of 26.4% was up 70 bps from 25.7% as at October 31, 2021, reflecting a favourable impact from the net issuance of external TLAC instruments, partially offset by the factors noted above under the Total capital ratio.

Our TLAC leverage ratio of 8.5% was down 10 bps from 8.6%, as at October 31, 2021, reflecting the factors noted above under the Leverage ratio, partially offset by a favourable impact from the net issuance of external TLAC instruments.

External TLAC instruments include long-term senior debt subject to conversion into common shares under the Bail-in regime. For further details, refer to Deposit and funding profile in the Liquidity and funding risk section.

Basel III RWA

OSFI requires banks to meet minimum risk-based capital requirements for exposures to credit risk, operational risk, and where they have significant trading activity, market risk. RWA is calculated for each of these risk types and added together to determine total RWA. In addition, a minimum capital floor requirement must be maintained as prescribed under OSFI's CAR guidelines which is currently set to 70% of RWA as calculated under current Basel III standardized credit risk and market risk approaches as defined in the CAR guidelines. If the capital requirement is less than the required threshold, a floor adjustment to RWA must be applied to the reported RWA as prescribed by OSFI's CAR guidelines.

Table of Contents

Total risk-weighted assets — Table 67

As at October 31 (Millions of Canadian dollars, except percentage amounts)	2022 Exposure (1)	Average of risk-weights (2)	Risk-weighted assets: Standardized approach	Advanced approach	Other	2022 Total	2021 Total
Credit risk							
Lending-related and other							
Residential mortgages (3)	$ 500,986	8%	$ 13,518	$ 28,144	$ –	$ 41,662	$ 34,958
Other retail (3)	245,633	27%	8,307	57,199	–	65,506	63,422
Business	476,896	50%	72,399	166,424	–	238,823	200,553
Sovereign	340,529	5%	3,034	12,876	–	15,910	14,412
Bank	30,348	18%	1,484	3,999	–	5,483	4,756
Total lending-related and other	$ 1,594,392	23%	$ 98,742	$ 268,642	$ –	$ 367,384	$ 318,101
Trading-related							
Repo-style transactions	$ 987,066	1%	$ 18	$ 8,557	$ 93	$ 8,668	$ 9,537
Derivatives	137,865	29%	2,284	21,566	16,288	40,138	42,377
Total trading-related	$ 1,124,931	4%	$ 2,302	$ 30,123	$ 16,381	$ 48,806	$ 51,914
Total lending-related and other and trading-related	$ 2,719,323	15%	$ 101,044	$ 298,765	$ 16,381	$ 416,190	$ 370,015
Bank book equities	4,346	131%	–	5,682	–	5,682	5,474
Securitization exposures	74,839	17%	5,912	6,631	–	12,543	10,328
Regulatory scaling factor	n.a.	n.a.	n.a.	18,267	n.a.	18,267	16,485
Other assets	31,620	140%	n.a.	n.a.	44,216	44,216	41,840
Total credit risk	$ 2,830,128	18%	$ 106,956	$ 329,345	$ 60,597	$ 496,898	$ 444,142
Market risk							
Interest rate			$ 2,321	10,935	–	13,256	$ 14,380
Equity			2,538	1,463	–	4,001	4,178
Foreign exchange			3,394	341	–	3,735	3,083
Commodities			1,630	120	–	1,750	762
Specific risk			7,370	1,041	–	8,411	7,601
Incremental risk charge			–	4,189	–	4,189	4,802
Total market risk			$ 17,253	$ 18,089	$ –	$ 35,342	$ 34,806
Operational risk			$ 77,639	–	n.a.	$ 77,639	$ 73,593
Total risk-weighted assets	$ 2,830,128		$ 201,848	$ 347,434	$ 60,597	$ 609,879	$ 552,541

(1) Total exposure represents EAD which is the expected gross exposure upon the default of an obligor. This amount is before any allowance against impaired loans or partial write-offs and does not reflect the impact of credit risk mitigation and collateral held.
(2) Represents the average of counterparty risk weights within a particular category.
(3) Home equity line of credit (HELOC) exposures under the IRB Approach reported as "Other Retail" in this table have now been grouped with Residential Mortgages to ensure consistent classification between the Standardized Approach and the IRB Approach. Prior period amounts have been reclassified to conform with this presentation.
n.a. not applicable

2022 vs. 2021

During the year, RWA was up $57 billion, mainly reflecting business growth in commercial and corporate lending, and residential mortgages, as well as the impact of foreign exchange translation. These factors were partially offset by favourable net credit migration, primarily in our wholesale portfolios, and model updates. The model updates mainly reflect the impact of the Q2 2020 period of significant market volatility no longer being reflected in our two-year historical VaR period. In our CET1 ratio the impact of foreign exchange translation on RWA is largely mitigated with economic hedges.

Selected capital management activity

Selected capital management activity — Table 68

(Millions of Canadian dollars, except number of shares)	For the year ended October 31, 2022		
	Issuance or redemption date	Number of shares (000s)	Amount
Tier 1 capital			
Common shares activity			
Issued in connection with share-based compensation plans (1)		**1,270**	**$ 99**
Purchased for cancellation (2)		**(40,866)**	**(509)**
Issuance of preferred shares, Series BT (2), (3)	**November 5, 2021**	**750**	**750**
Redemption of preferred shares, Series BJ (2), (3)	**February 24, 2022**	**(6,000)**	**(150)**
Tier 2 capital			
Issuance of May 3, 2032 subordinated debentures (3), (4)	**January 25, 2022**		**1,000**

(1) Amounts include cash received for stock options exercised during the period and fair value adjustments to stock options.
(2) For further details, refer to Note 20 of our 2022 Annual Consolidated Financial Statements.
(3) NVCC instruments.
(4) For further details, refer to Note 19 of our 2022 Annual Consolidated Financial Statements.

On December 6, 2021, we announced a normal course issuer bid (NCIB) to purchase up to 45 million of our common shares, commencing on December 8, 2021 and continuing until December 7, 2022, or such earlier date as we complete the repurchase of all shares permitted under the bid. Since the inception of this NCIB, the total number of common shares repurchased and cancelled was approximately 41 million, at a cost of approximately $5,426 million.

We determine the amount and timing of purchases under the NCIB, subject to prior consultation with OSFI. Purchases may be made through the TSX, the NYSE and other designated exchanges and alternative Canadian trading systems. The price paid for repurchased shares is the prevailing market price at the time of acquisition.

On November 5, 2021, we issued 750 thousand of Non-Cumulative 5-Year Fixed Rate Reset First Preferred Shares Series BT to certain institutional investors at a price of $1,000 per share.

On January 25, 2022, we issued $1,000 million of NVCC subordinated debentures. The notes bear interest at a fixed rate of 2.94% per annum until May 3, 2027, and at the three-month CDOR plus 0.76% thereafter until their maturity on May 3, 2032.

On February 24, 2022, we redeemed all 6 million of our issued and outstanding Non-Cumulative First Preferred Shares Series BJ at a price of $25.75 per share.

Dividends

Our common share dividend policy reflects our earnings outlook, payout ratio objective and the need to maintain adequate levels of capital to support business plans. In 2022, our dividend payout ratio was 45%. Common share dividends paid during the year were $7 billion.

Table of Contents

Selected share data (1) — **Table 69**

(Millions of Canadian dollars, except number of shares and as otherwise noted)	2022 Number of shares (000s)	2022 Amount	2022 Dividends declared per share	2021 Number of shares (000s)	2021 Amount	2021 Dividends declared per share
Common shares issued	**1,385,591**	**$ 17,318**	**$ 4.96**	1,425,187	$ 17,728	$ 4.32
Treasury shares – common shares (2)	**(2,680)**	**(334)**		(662)	(73)	
Common shares outstanding	**1,382,911**	**$ 16,984**		1,424,525	$ 17,655	
Stock options and awards						
Outstanding	**7,535**			7,653		
Exercisable	**3,502**			3,273		
Available for grant	**4,696**			5,847		
First preferred shares issued						
Non-cumulative Series AZ (3), (4)	**20,000**	**$ 500**	**$ 0.93**	20,000	$ 500	$ 0.93
Non-cumulative Series BB (3), (4)	**20,000**	**500**	**0.91**	20,000	500	0.91
Non-cumulative Series BD (3), (4)	**24,000**	**600**	**0.80**	24,000	600	0.80
Non-cumulative Series BF (3), (4)	**12,000**	**300**	**0.75**	12,000	300	0.75
Non-cumulative Series BH (4)	**6,000**	**150**	**1.23**	6,000	150	1.23
Non-cumulative Series BI (4)	**6,000**	**150**	**1.23**	6,000	150	1.23
Non-cumulative Series BJ (4)	**–**	**–**	**0.33**	6,000	150	1.31
Non-cumulative Series BO (3), (4)	**14,000**	**350**	**1.20**	14,000	350	1.20
Non-cumulative Series BT (3), (4), (5)	**750**	**750**	**4.20%**	–	–	–
Non-cumulative Series C-2 (6)	**15**	**23**	**US$ 67.50**	15	23	US$ 67.50
Other equity instruments issued						
Limited recourse capital notes Series 1 (3), (4), (7), (8)	**1,750**	**1,750**	**4.50%**	1,750	1,750	4.50%
Limited recourse capital notes Series 2 (3), (4), (7), (8)	**1,250**	**1,250**	**4.00%**	1,250	1,250	4.00%
Limited recourse capital notes Series 3 (3), (4), (7), (8)	**1,000**	**1,000**	**3.65%**	1,000	1,000	3.65%
Preferred shares and other equity instruments issued	**106,765**	**$ 7,323**		112,015	$ 6,723	
Treasury instruments – preferred shares and other equity instruments (2)	**(12)**	**(5)**		(164)	(39)	
Preferred shares and other equity instruments outstanding	**106,753**	**$ 7,318**		111,851	$ 6,684	
Dividends on common shares		**$ 6,946**			$ 6,158	
Dividends on preferred shares and distributions on other equity instruments (9)		**247**			257	

(1) For further details about our capital management activity, refer to Note 20 of our 2022 Annual Consolidated Financial Statements.

(2) Positive amounts represent a short position and negative amounts represent a long position.

(3) Dividend rate will reset every five years.

(4) NVCC instruments.

(5) The dividends declared per share represent per annum dividend rate applicable to the shares issued as at the reporting date.

(6) Represents 615,400 depositary shares relating to preferred shares Series C-2. Each depositary share represents one-fortieth interest in a share of Series C-2.

(7) For Limited Recourse Capital Notes (LRCN) Series, the number of shares represent the number of notes issued and the dividends declared per share represent the annual interest rate percentage applicable to the notes issued as at the reporting date.

(8) In connection with the issuance of LRCN Series 1, on July 28, 2020, we issued $1,750 million of First Preferred Shares Series BQ (Series BQ); in connection with the issuance of LRCN Series 2, on November 2, 2020, we issued $1,250 million of First Preferred Shares Series BR (Series BR); and in connection with the issuance of LRCN Series 3, on June 8, 2021, we issued $1,000 million of First Preferred Shares Series BS (Series BS). The Series BQ, BR and BS preferred shares were issued at a price of $1,000 per share and were issued to a consolidated trust to be held as trust assets in connection with the LRCN structure. For further details, refer to Note 20 of our 2022 Annual Consolidated Financial Statements.

(9) Excludes distributions to non-controlling interests.

As at November 25, 2022, the number of outstanding common shares was 1,382,866,527, net of treasury shares held of 2,788,345, and the number of stock options and awards was 7,471,143.

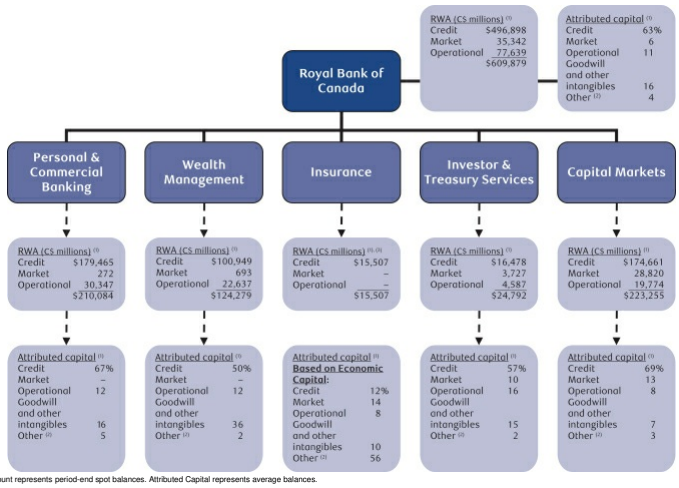
NVCC provisions require the conversion of the capital instrument into a variable number of common shares in the event that OSFI deems a bank to benon-viable or a federal or provincial government in Canada publicly announces that a bank has accepted or agreed to accept a capital injection. If a NVCC trigger event were to occur, our NVCC capital instruments as at October 31, 2022, which were the preferred shares Series AZ, BB, BD, BF, BH, BI, BO, BT, LRCN Series 1, LRCN Series 2, LRCN Series 3 and subordinated debentures due on January 27, 2026, July 25, 2029, December 23, 2029, June 30, 2030, January 28, 2033, November 3, 2031, and May 3, 2032 would be converted into common shares pursuant to an automatic conversion formula with a conversion price based on the greater of: (i) a contractual floor price of $5.00, and (ii) the current market price of our common shares at the time of the trigger event (10-day weighted average). Based on a floor price of $5.00 and including an estimate for accrued dividends and interest, these NVCC capital instruments would convert into a maximum of 4,541 million common shares, in aggregate, which would represent a dilution impact of 76.66% based on the number of common shares outstanding as at October 31, 2022.

Attributed capital

Our methodology for allocating capital to our business segments is based on the Basel III regulatory capital requirements, with the exception of Insurance. For Insurance, the allocation of capital is based on fully diversified economic capital. Risk-based capital attribution provides a uniform base for performance measurement among business segments, which compares to our overall corporate return objective and facilitates management decisions in resource allocation in conjunction with other factors.

The calculation and attribution of capital involves a number of assumptions and judgments by management which are monitored to ensure that the regulatory capital framework remains comprehensive and consistent. The models are benchmarked to leading industry practices via participation in surveys, reviews of methodologies and ongoing interaction with external risk management industry professionals.

For additional information on the risks highlighted below, refer to the Risk management section.



(1) RWA amount represents period-end spot balances. Attributed Capital represents average balances.

(2) Other includes (a) non-Insurance segments: equity required to underpin Basel III regulatory capital deductions other than Goodwill and other intangibles as well as capital modifications for expected loss provisioning and (b) Insurance segment: equity required to underpin risks associated with business, fixed assets and insurance risks.

(3) Insurance RWA represents our investments in the insurance subsidiaries capitalized at the regulatory prescribed rate as required under the OSFI CAR guideline.

Other considerations affecting capital
Capital treatment for equity investments in other entities is determined by a combination of accounting and regulatory guidelines based on the size or nature of the investment. Three broad approaches apply as follows:

- Consolidation: entities which we control are consolidated on our Consolidated Balance Sheets.
- Deduction: certain holdings are deducted from our regulatory capital. These include all unconsolidated "substantial investments," as defined by the *Bank Act* (Canada) in the capital of financial institutions, as well as all investments in insurance subsidiaries.
- Risk-weighting: equity investments that are not deducted from capital are risk-weighted at a prescribed rate for determination of capital charges.

Regulatory capital approach for securitization exposures
Our securitization regulatory capital approach reflects Chapter 7 of OSFI's CAR guidelines. For our securitization exposures, we use an internal assessment approach (IAA) for exposures related to our ABCP business, and as per regulatory guidelines for other securitization exposures we use a combination of approaches including an external ratings based approach, an IRB approach and a standardized approach.

While our IAA rating methodologies are based in large part on criteria that are published by External Credit Assessment Institutions (ECAIs) such as S&P and therefore are similar to the methodologies used by these institutions, they are not identical. Our ratings process includes a comparison of the available credit enhancement in a securitization structure to a stressed level of projected losses. The stress level used is determined by the desired risk profile of the transaction. As a result, we stress the cash flows of a given transaction at a higher level in order to achieve a higher rating. Conversely, transactions that only pass lower stress levels achieve lower ratings.

Most of the other securitization exposures (non-ABCP) carry external ratings and we use the external rating for determining the proper capital allocation for these positions. We periodically compare our own ratings to ECAIs ratings to ensure that the ratings provided by ECAIs are reasonable.

GRM is responsible for providing risk assessments for capital purposes in respect of all our banking book exposures. GRM is independent of the business originating the securitization exposures and performs its own analysis, sometimes in conjunction with but always independent of the applicable business. GRM has developed asset class specific criteria guidelines which provide the rating methodologies for each asset class. The guidelines are reviewed periodically and are subject to the ratings replication process mandated by Pillar I of the Basel rules.

Regulatory developments
Basel III reforms
On November 11, 2021, BCBS finalized the disclosure requirements for the *Minimum capital requirements for market risk* standards published in January 2019.

On January 31, 2022, OSFI announced revised capital, leverage, liquidity and disclosure rules that incorporate the final BCBS Basel III reforms. The revised rules include new CAR, LR, LAR guidelines and related Pillar 3 disclosure requirements. The revised CAR (other than credit valuation adjustment and market risk), LR and Pillar 3 guidelines come into effect for us in Q2 2023. The revised LAR guidelines are effective for us on April 1, 2023. The revised CVA and market risk chapters of the CAR guidelines are effective for us in Q1 2024. We continue to assess the impact of the revised frameworks and are taking appropriate steps to ensure we are ready for adoption in Q2 2023 and Q1 2024. We do not anticipate any issues in complying with the new framework requirements. We expect to continue to engage with OSFI on the domestic implementation of the Basel III reforms and are taking appropriate steps to ensure required adoption readiness based on guidance provided to date.

Assurance on Capital, Leverage and Liquidity Returns
On November 7, 2022, OSFI released a new guideline – *Assurance on Capital, Leverage and Liquidity Returns*, which establishes expectations on OSFI's assurance requirements over regulatory returns. This guideline provides principles-based and risk-based guidance to external auditors and institutions in an effort to enhance and align these expectations across all federally regulated financial institutions (FRFIs). This guidance will be effective for us beginning in fiscal 2023. We are assessing the finalised requirements and we do not anticipate any issues in meeting OSFI's minimum assurance requirements for our regulatory filings related to our capital (including TLAC), leverage and liquidity returns.

Accounting and control matters

Critical accounting policies and estimates

Application of critical accounting policies, judgments, estimates and assumptions
Our significant accounting policies are described in Note 2 of our 2022 Annual Consolidated Financial Statements. Certain of these policies and related estimates are recognized as critical because they require us to make particularly subjective or complex judgments about matters that are inherently uncertain and significantly different amounts could be reported under different conditions or using different assumptions. Our critical accounting judgments, estimates and assumptions relate to the fair value of financial instruments, ACL, goodwill and other intangible assets, employee benefits, consolidation, derecognition of financial assets, application of the effective interest method, provisions, insurance claims and policy benefit liabilities, and income taxes. Our critical accounting policies and estimates have been reviewed and approved by our Audit Committee, in consultation with management, as part of their review and approval of our significant accounting policies, judgments, estimates and assumptions.

Fair value of financial instruments
The fair value of a financial instrument is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. We determine fair value by incorporating factors that market participants would consider in setting a price, including commonly accepted valuation approaches.

We give priority to third-party pricing services and valuation techniques with the highest and most consistent accuracy. The level of accuracy is determined over time by comparing third-party price values to traders' or system values, other pricing service values and, when available, actual trade data. Other valuation techniques are used when a price or quote is not available. Some valuation processes use models to determine fair value. We have a systematic and consistent approach to control the use of models.

In determining fair value, a hierarchy is used which prioritizes the inputs to valuation techniques. The fair value hierarchy gives the highest priority to unadjusted quoted prices in active markets and the lowest priority to unobservable inputs. Fair values established based on this hierarchy require the use of observable market data whenever available. Level 1 inputs are unadjusted quoted prices in active markets for identical assets or liabilities that we have the ability to access at the measurement date. Level 2 inputs include quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and model inputs that are either observable, or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Level 3 inputs include one or more inputs that are unobservable and significant to the fair value of the asset or liability. Unobservable inputs are used to measure fair value to the extent that observable inputs are not available at the measurement date. The availability of inputs for valuation may affect the selection of valuation techniques. The classification of a financial instrument in the fair value hierarchy for disclosure purposes is based upon the lowest level of input that is significant to the measurement of fair value.

Where observable prices or inputs are not available, management judgment is required to determine fair values by assessing other relevant sources of information such as historical data, proxy information from similar transactions, and through extrapolation and interpolation techniques. For more complex or illiquid instruments, significant judgment is required to determine the model used, select the model inputs, and in some cases, apply valuation adjustments to the model value or quoted price for inactively traded financial instruments. The selection of model inputs may be subjective and the inputs may be unobservable. Unobservable inputs are inherently uncertain as there is little or no market data available from which to determine the level at which the transaction would occur under normal business circumstances. Appropriate parameter uncertainty and market risk valuation adjustments for such inputs and other model risk valuation adjustments are assessed in all such instances.

Valuation adjustments may be subjective as they require significant judgment in the input selection, such as the PD and recovery rate, and are intended to arrive at a fair value that is determined based on assumptions that market participants would use in pricing the financial instrument. The realized price for a transaction may be different from its recorded value that was previously estimated using management judgment, and may therefore impact unrealized gains and losses recognized in Non-interest income – Trading revenue or Other.

For further information on the fair value of financial instruments, refer to Notes 2 and 3 of our 2022 Annual Consolidated Financial Statements.

Allowance for credit losses

An ACL is established for all financial assets, except for financial assets classified or designated as FVTPL and equity securities designated as FVOCI, which are not subject to impairment assessment. Assets subject to impairment assessment include certain loans, debt securities, interest-bearing deposits with banks, customers' liability under acceptances, accounts and accrued interest receivable, and finance and operating lease receivables. Off-balance sheet items subject to impairment assessment include financial guarantees and undrawn loan commitments.

We measure the ACL on each balance sheet date according to a three-stage expected credit loss impairment model:

- Performing financial assets
  - Stage 1 – From initial recognition of a financial asset to the date on which the asset has experienced a significant increase in credit risk relative to its initial recognition, a loss allowance is recognized equal to the credit losses expected to result from defaults occurring over the 12 months following the reporting date.
  - Stage 2 – Following a significant increase in credit risk relative to the initial recognition of the financial asset, a loss allowance is recognized equal to the credit losses expected over the remaining lifetime of the asset.
- Impaired financial assets
  - Stage 3 – When a financial asset is considered to be credit-impaired, a loss allowance is recognized equal to credit losses expected over the remaining lifetime of the asset. Interest income is calculated based on the carrying amount of the asset, net of the loss allowance, rather than on its gross carrying amount.

The ACL is a discounted probability-weighted estimate of the cash shortfalls expected to result from defaults over the relevant time horizon. For loan commitments, credit loss estimates consider the portion of the commitment that is expected to be drawn over the relevant time period. For financial guarantees, credit loss estimates are based on the expected payments required under the guarantee contract. For finance lease receivables, credit loss estimates are based on cash flows consistent with the cash flows used in measuring the lease receivable.

The ACL represents an unbiased estimate of expected credit losses on our financial assets as at the balance sheet date. Judgment is required in making assumptions and estimations when calculating the ACL, including movements between the three stages, the inclusion of forward looking information and the application of expert credit judgment. The underlying assumptions and estimates may result in changes to the provisions from period to period that significantly affect our results of operations.

For further information on ACL, refer to Notes 2, 4 and 5 of our 2022 Annual Consolidated Financial Statements.

Goodwill and other intangible assets

We allocate goodwill to groups of cash-generating units (CGU). Goodwill is not amortized and is tested for impairment on an annual basis, or more frequently if there are objective indications of impairment. We test for impairment by comparing the recoverable amount of a CGU with its carrying amount.

We estimate the value in use and fair value less costs of disposal of our CGUs primarily using a discounted cash flow method which incorporates each CGU's internal forecasts of revenues and expenses. Significant management judgment is applied in the determination of expected future cash flows (uncertainty in timing and amount), discount rates (based on CGU-specific risks) and terminal growth rates. CGU-specific risks include country risk, business/operational risk, geographic risk (including political risk, devaluation risk and government regulation), currency risk and price risk (including product pricing risk and inflation). If the future cash flows and other assumptions in future periods deviate significantly from the current amounts used in our impairment testing, the value of our goodwill could become impaired.

We assess for indicators of impairment of our other intangible assets at each reporting period. If there is an indication that an asset may be impaired, an impairment test is performed by comparing the carrying amount of the intangible asset to its recoverable amount. Where it is not possible to estimate the recoverable amount of an individual asset, we estimate the recoverable amount of the CGU to which the asset belongs. Significant judgment is applied in estimating the useful lives and recoverable amounts of our intangible assets and assessing whether certain events or circumstances constitute objective evidence of impairment. We do not have any intangible assets with indefinite lives.

For further details, refer to Notes 2 and 11 of our 2022 Annual Consolidated Financial Statements.

Employee benefits

We sponsor a number of benefit programs for eligible employees, including registered pension plans, supplemental pension plans, health, dental, disability and life insurance plans.

The calculation of defined benefit expenses and obligations depends on various assumptions such as discount rates, healthcare cost trend rates, projected salary increases, retirement age, and mortality and termination rates. Discount rates are determined using a yield curve based on spot rates from high quality corporate bonds. All other assumptions are determined by us and are reviewed by the actuaries. Actual experience that differs from the actuarial assumptions will affect the amounts of benefit obligations and remeasurements that we recognize. The weighted average assumptions used and the sensitivity of key assumptions are presented in Note 17 of our 2022 Annual Consolidated Financial Statements.

Consolidation of structured entities

Subsidiaries are those entities, including structured entities, over which we have control. We control an entity when we are exposed, or have rights, to variable returns from our involvement with the entity and have the ability to affect those returns through our power over the investee. We have power over an entity when we have existing rights that give us the current ability to direct the activities that most significantly affect the entity's returns (relevant activities). Power may be determined on the basis of voting rights or, in the case of structured entities, other contractual arrangements.

We are not deemed to control an entity when we exercise power over an entity as the agent of a third party or parties. In determining whether we are acting as an agent, we consider the overall relationship between us, the investee and other parties to the arrangement with respect to the following factors: (i) the scope of our decision-making power; (ii) the rights held by other parties; (iii) the remuneration to which we are entitled; and (iv) our exposure to variability of returns.

The determination of control is based on the current facts and circumstances and is continuously assessed. In some circumstances, different factors and conditions may indicate that various parties control an entity depending on whether those factors and conditions are assessed in isolation or in totality. Significant judgment is applied in determining whether we control an entity, specifically, assessing whether we have substantive decision-making rights over the relevant activities and whether we are exercising our power as a principal or an agent.

We consolidate all subsidiaries from the date control is transferred to us, and cease consolidation when an entity is no longer controlled by us. Our consolidation conclusions affect the classification and amount of assets, liabilities, revenues and expenses reported in our Consolidated Financial Statements.

For further details, refer to Note 8 of our 2022 Annual Consolidated Financial Statements.

Derecognition of financial assets

We periodically enter into transactions in which we transfer financial assets such as loans or MBS to structured entities or trusts that issue securities to investors. We derecognize the assets when our contractual rights to the cash flows from the assets have expired; when we retain the rights to receive the cash flows but assume an obligation to pay those cash flows to a third party subject to certain pass-through requirements; or when we transfer our contractual rights to receive the cash flows and substantially all of the risks and rewards of the assets have been transferred. When we retain substantially all of the risks and rewards of the transferred assets, the transferred assets are not derecognized from our Consolidated Balance Sheets and are accounted for as secured financing transactions. When we neither retain nor transfer substantially all risks and rewards of ownership of the assets, we derecognize the assets if control over the assets is relinquished. If we retain control over the transferred assets, we continue to recognize the transferred assets to the extent of our continuing involvement. Management judgment is applied in determining whether we have transferred or retained substantially all risk and rewards of ownership of the transferred financial asset.

The majority of assets transferred under repurchase agreements, securities lending agreements, and in our Canadian residential mortgage securitization transactions do not qualify for derecognition. As a result, we continue to record the associated transferred assets on our Consolidated Balance Sheets and no gains or losses are recognized for those securitization activities. Otherwise, a gain or loss is recognized on securitization by comparing the carrying amount of the transferred asset with its fair value at the date of the transfer. For further information on derecognition of financial assets, refer to Notes 2 and 7 of our 2022 Annual Consolidated Financial Statements.

Application of the effective interest method

Interest is recognized in Interest income and Interest expense in the Consolidated Statements of Income generally for all interest bearing financial instruments using the effective interest method. The effective interest rate is the rate that discounts estimated future cash flows over the expected life of the financial asset or liability to the net carrying amount upon initial recognition. Significant judgment is applied in determining the effective interest rate due to uncertainty in the timing and amounts of future cash flows.

Provisions

Provisions are liabilities of uncertain timing or amount and are recognized when we have a present legal or constructive obligation as a result of a past event, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Provisions are measured as the best estimate of the consideration required to settle the present obligation at the reporting date. Significant judgment is required in determining whether a present obligation exists and in estimating the probability, timing and amount of any outflows. We record provisions related to litigation, asset retirement obligations and other items.

The forward-looking nature of these estimates requires us to use a significant amount of judgment in projecting the timing and amount of future cash flows. We record our provisions on the basis of all available information at the end of the reporting period and make adjustments on a quarterly basis to reflect current expectations. Should actual results differ from our expectations, we may incur expenses in excess of the provisions recognized.

Insurance claims and policy benefit liabilities
Insurance claims and policy benefit liabilities represent current claims and estimates for future insurance policy benefits. Liabilities for life insurance contracts are determined using the Canadian Asset Liability Method, which incorporates assumptions for mortality, morbidity, policy lapses and surrenders, investment yields, policy dividends, operating and policy maintenance expenses, and provisions for adverse deviation. Key assumptions are reviewed annually and updated in response to actual experience and market conditions. Liabilities for property and casualty insurance represent estimated provisions for reported and unreported claims. Liabilities for life and property and casualty insurance are included in Insurance claims and policy benefit liabilities. Changes in Insurance claims and policy benefit liabilities are included in the Insurance policyholder benefits, claims and acquisition expense in our Consolidated Statements of Income in the period in which the estimates change. Refer to Note 15 of our 2022 Annual Consolidated Financial Statements for further information.

Income taxes
We are subject to income tax laws in various jurisdictions where we operate, and the complex tax laws are potentially subject to different interpretations by us and the relevant taxation authority. Management judgment is applied in interpreting the relevant tax laws, in assessing the probability of acceptance of our tax positions by the relevant tax authorities and in estimating the expected timing and amount of the provision for current and deferred income taxes. A deferred tax asset or liability is determined for each temporary difference based on the tax rates that are expected to be in effect in the period that the asset is realized or the liability is settled, except for earnings related to our subsidiaries, branches, associates and interests in joint ventures where the temporary differences will not reverse in the foreseeable future and we have the ability to control the timing of reversal.

On a quarterly basis, we review whether it is probable that the benefits associated with our deferred tax assets will be realized, using both positive and negative evidence. Refer to Note 22 of our 2022 Annual Consolidated Financial Statements for further information.

Future changes in accounting policy and disclosure

IFRS 17 *Insurance Contracts* (IFRS 17)
In May 2017, the IASB issued IFRS 17 to establish a comprehensive insurance standard which provides guidance on the recognition, measurement, presentation and disclosures of insurance contracts. IFRS 17 requires entities to measure insurance contract liabilities at their current fulfillment values using one of three approaches depending on the nature of the contract. In June 2020, the IASB issued amendments to IFRS 17, including deferral of the effective date by two years. This new standard will be effective for us on November 1, 2023 and will be applied retrospectively with restatement of comparatives. If full retrospective application to a group of contracts is impracticable, the modified retrospective or fair value approach may be used. To manage the transition to IFRS 17, we established a comprehensive program and governance structure led by Finance and the Insurance business that focuses on the evaluation of the impacts of the standard and implementation of policies, systems and processes required for the adoption. Significant progress has been made in preparing for the implementation of IFRS 17. We expect the adoption of IFRS 17 to affect the timing of earnings recognition for our insurance contracts and the carrying amount of our insurance contract liabilities. We continue to assess the impacts of adopting IFRS 17 on our Consolidated Financial Statements.

Controls and procedures

Disclosure controls and procedures
Our disclosure controls and procedures are designed to provide reasonable assurance that information required to be disclosed by us in reports filed or submitted under Canadian and U.S. securities laws is recorded, processed, summarized and reported within the time periods specified under those laws and include controls and procedures that are designed to ensure that information is accumulated and communicated to management, including the President and Chief Executive Officer, and the Chief Financial Officer, to allow timely decisions regarding required disclosure.

As of October 31, 2022, management evaluated, under the supervision of and with the participation of the President and Chief Executive Officer and the Chief Financial Officer, the effectiveness of our disclosure controls and procedures as defined under rules adopted by the U.S. SEC. Based on that evaluation, the President and Chief Executive Officer and the Chief Financial Officer concluded that our disclosure controls and procedures were effective as of October 31, 2022.

Internal control over financial reporting
Management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with IFRS. However, because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements on a timely basis. See Management's Report on Internal Control over Financial Reporting and the Report of Independent Registered Public Accounting Firm.

There were no changes in our internal control over financial reporting during the year ended October 31, 2022 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Related party transactions

In the ordinary course of business, we provide normal banking services and operational services, and enter into other transactions with associated and other related corporations, including our joint venture entities, on terms similar to those offered to non-related parties. We grant loans to directors, officers and other employees at rates normally accorded to preferred clients. In addition, we offer deferred share and other plans to non-employee directors, executives and certain other key employees. For further information, refer to Notes 12 and 26 of our audited 2022 Annual Consolidated Financial Statements.

Table of Contents

Supplementary information

Selected annual information — Table 70

(Millions of Canadian dollars, except per share amounts)	2022	2021	2020
Total revenue	**$ 48,985**	$ 49,693	$ 47,181
Net income attributable to:			
Shareholders	**15,794**	16,038	11,432
Non-controlling interest	**13**	12	5
	$ 15,807	$ 16,050	$ 11,437
Basic earnings per share	**$ 11.08**	$ 11.08	$ 7.84
Diluted earnings per share	**11.06**	11.06	7.82
Dividends declared per common shares	**4.96**	4.32	4.29
Total assets	**$ 1,917,219**	$ 1,706,323	$ 1,624,548
Deposits	**1,208,814**	1,100,831	1,011,885

Table of Contents

Net interest income on average assets and liabilities — Table 71

(Millions of Canadian dollars, except for percentage amounts) (1)	Average balances 2022	Average balances 2021	Interest 2022	Interest 2021	Average rate 2022	Average rate 2021
Assets						
Deposits with other banks						
Canada	**$ 13,119**	$ 10,580	**$ 582**	$ 106	**4.44%**	1.00%
U.S.	**81,962**	56,973	**911**	63	**1.11**	0.11
Other International	**22,819**	22,244	**204**	136	**0.89**	0.61
	117,900	89,797	**1,697**	305	**1.44**	0.34
Securities						
Trading	**135,117**	128,977	**4,754**	3,736	**3.52**	2.90
Investment, net of applicable allowance	**150,384**	131,612	**2,308**	1,141	**1.53**	0.87
	285,501	260,589	**7,062**	4,877	**2.47**	1.87
Asset purchased under reverse repurchase agreements and securities borrowed	**360,068**	317,997	**5,447**	1,309	**1.51**	0.41
Loans (2)						
Canada						
Retail	**478,696**	441,380	**15,146**	13,658	**3.16**	3.09
Wholesale	**103,034**	86,978	**5,344**	3,557	**5.19**	4.09
	581,730	528,358	**20,490**	17,215	**3.52**	3.26
U.S.	**136,937**	110,314	**4,037**	2,880	**2.95**	2.61
Other International	**49,630**	40,619	**2,038**	1,559	**4.11**	3.84
	768,297	679,291	**26,565**	21,654	**3.46**	3.19
Total interest-earning assets	**1,531,766**	1,347,674	**40,771**	28,145	**2.66**	2.09
Non-interest-bearing deposits with other banks	**99,564**	120,154	**–**	–	**–**	–
Customers' liability under acceptances	**18,354**	19,410	**–**	–	**–**	–
Other assets	**237,167**	190,963	**–**	–	**–**	–
Total assets	**$ 1,886,851**	$ 1,678,200	**$ 40,771**	$ 28,145	**2.16%**	1.68%
Liabilities and shareholders' equity						
Deposits (3)						
Canada	**$ 684,452**	$ 626,549	**$ 8,660**	$ 4,700	**1.27%**	0.75%
U.S.	**153,039**	132,833	**1,044**	231	**0.68**	0.17
Other International	**101,058**	97,355	**1,047**	517	**1.04**	0.53
	938,549	856,737	**10,751**	5,448	**1.15**	0.64
Obligations related to securities sold short	**39,079**	33,566	**2,409**	1,809	**6.16**	5.39
Obligations related to assets sold under repurchase agreements and securities loaned	**315,871**	275,870	**4,351**	574	**1.38**	0.21
Subordinated debentures	**10,133**	9,174	**288**	179	**2.84**	1.95
Other interest-bearing liabilities	**26,000**	23,486	**255**	133	**0.98**	0.57
Total interest-bearing liabilities	**1,329,632**	1,198,833	**18,054**	8,143	**1.36**	0.68
Non-interest-bearing deposits	**226,376**	202,316	**–**	–	**–**	–
Acceptances	**18,409**	19,516	**–**	–	**–**	–
Other liabilities	**209,890**	165,286	**–**	–	**–**	–
Total liabilities	**$ 1,784,307**	$ 1,585,951	**$ 18,054**	$ 8,143	**1.01%**	0.51%
Equity	**$ 102,544**	$ 92,250	**n.a.**	n.a.	**n.a.**	n.a.
Total liabilities and shareholders' equity	**$ 1,886,851**	$ 1,678,200	**$ 18,054**	$ 8,143	**0.96%**	0.49%
Net interest income and margin	**$ 1,886,851**	$ 1,678,200	**$ 22,717**	$ 20,002	**1.20%**	1.19%
Net interest income and margin (average earning assets, net) (4)						
Canada	**$ 870,147**	$ 793,130	**$ 15,761**	$ 13,947	**1.81%**	1.76%
U.S.	**437,357**	349,840	**5,423**	4,447	**1.24**	1.27
Other International	**224,261**	204,706	**1,533**	1,608	**0.68**	0.79
Total	**$ 1,531,765**	$ 1,347,676	**$ 22,717**	$ 20,002	**1.48%**	1.48%

(1) Insurance segment assets and liabilities are included in Other assets and Other liabilities, respectively.

(2) Interest income includes loan fees of $1,033 million (2021 – $888 million; 2020 – $797 million).

(3) Deposits include personal chequing and savings deposits with average balances of $279 billion (2021 – $258 billion; 2020 – $218 billion), interest expense of $712 million (2021 – $175 million; 2020 – $498 million) and average rates of 0.26% (2021 – 0.07%; 2020 – 0.2%). Deposits also include term deposits with average balances of $500 billion (2021 – $437 billion; 2020 – $443 billion), interest expense of $7,323 million (2021 – $4,487 million; 2020 – $6,774 million) and average rates of 1.46% (2021 – 1.03%; 2020 – 1.53%).

(4) Geographic classification for selected assets and liabilities is based on the domicile of the booking point of the subject assets and liabilities.

n.a. not applicable

Table of Contents

Change in net interest income — Table 72

(Millions of Canadian dollars) (1)	2022 vs. 2021 Increase (decrease) due to changes in Average volume (2)	Average rate (2)	Net change	2021 vs. 2020 Increase (decrease) due to changes in Average volume (2)	Average rate (2)	Net change
Assets						
Deposits with other banks						
Canada (3)	$ 25	$ 451	$ 476	$ (27)	$ 18	$ (9)
U.S. (3)	28	820	848	93	(190)	(97)
Other international (3)	4	64	68	–	104	104
Securities						
Trading	178	840	1,018	(95)	(791)	(886)
Investment, net of applicable allowance	163	1,004	1,167	51	(776)	(725)
Asset purchased under reverse repurchase agreements and securities borrowed	173	3,965	4,138	(583)	(2,776)	(3,359)
Loans						
Canada (3)						
Retail (3)	1,155	333	1,488	1,343	(2,219)	(876)
Wholesale (3)	657	1,130	1,787	(281)	(341)	(622)
U.S. (3)	695	462	1,157	(44)	(110)	(154)
Other international (3)	346	133	479	116	(230)	(114)
Total interest income	$ 3,424	$ 9,202	$ 12,626	$ 573	$ (7,311)	$ (6,738)
Liabilities						
Deposits						
Canada (3)	434	3,526	3,960	167	(2,845)	(2,678)
U.S. (3)	35	778	813	167	(594)	(427)
Other international (3)	20	510	530	30	(260)	(230)
Obligations related to securities sold short	297	303	600	(145)	(246)	(391)
Obligations related to assets sold under repurchase agreements and securities loaned	83	3,694	3,777	(279)	(1,769)	(2,048)
Subordinated debentures	19	90	109	(10)	(91)	(101)
Other interest-bearing liabilities	14	108	122	(10)	(20)	(30)
Total interest expense	$ 902	$ 9,009	$ 9,911	$ (80)	$ (5,825)	$ (5,905)
Net interest income	$ 2,522	$ 193	$ 2,715	$ 653	$ (1,486)	$ (833)

(1) Insurance segment assets and liabilities are included in Other assets and Other liabilities, respectively.
(2) Volume/rate variance is allocated on the percentage relationships of changes in balances and changes in rates to the total net change in net interest income.
(3) Geographic classification for selected assets and liabilities is based on the domicile of the booking point of the subject assets and liabilities.

Loans and acceptances by geography — Table 73

As at October 31 (Millions of Canadian dollars)	2022	2021
Canada (1)		
Residential mortgages	$ 383,797	$ 354,169
Personal	79,422	78,232
Credit cards	19,778	17,235
Small business	12,669	12,003
Retail	495,666	461,639
Wholesale	126,751	107,750
	$ 622,417	$ 569,389
U.S. (1)		
Retail	47,402	35,601
Wholesale	114,799	86,041
	162,201	121,642
Other International (1)		
Retail	6,683	6,358
Wholesale	50,289	44,148
	56,972	50,506
Total loans and acceptances	$ 841,590	$ 741,537
Total allowance for credit losses	(3,798)	(4,164)
Total loans and acceptances, net of allowance for credit losses	$ 837,792	$ 737,373

(1) Geographic information is based on residence of borrower.

Table of Contents

Loans and acceptances by portfolio and sector — Table 74

As at October 31 (Millions of Canadian dollars)	2022	2021
Residential mortgages	**$ 418,796**	$ 380,332
Personal	**97,709**	93,441
Credit cards	**20,577**	17,822
Small business	**12,669**	12,003
Retail	**$ 549,751**	$ 503,598
Agriculture	**10,105**	9,250
Automotive	**8,770**	6,198
Banking	**7,016**	7,734
Consumer discretionary	**19,405**	14,806
Consumer staples	**6,940**	6,142
Oil and gas	**5,959**	5,283
Financial services	**41,353**	29,192
Financing products	**13,781**	10,273
Forest products	**1,094**	931
Governments	**5,632**	6,677
Industrial products	**10,537**	7,193
Information technology	**5,232**	3,569
Investments	**19,952**	19,392
Mining and metals	**2,223**	984
Public works and infrastructure	**3,006**	1,890
Real estate and related	**79,506**	66,798
Other services	**24,393**	20,550
Telecommunication and media	**7,176**	5,047
Transportation	**6,542**	6,251
Utilities	**11,847**	8,699
Other sectors	**1,370**	1,080
Wholesale	**$ 291,839**	$ 237,939
Total loans and acceptances	**$ 841,590**	$ 741,537
Total allowance for credit losses	**(3,798)**	(4,164)
Total loans and acceptances, net of allowance for credit losses	**$ 837,792**	$ 737,373

Table of Contents

Gross impaired loans by portfolio and geography — Table 75

As at October 31 (Millions of Canadian dollars, except for percentage amounts)	2022	2021
Residential mortgages	$ 560	$ 645
Personal	200	197
Small business	138	109
Retail	898	951
Agriculture	$ 18	$ 11
Automotive	9	8
Banking	1	–
Consumer discretionary	254	274
Consumer staples	122	32
Oil and gas	57	131
Financial services	96	77
Financing products	–	–
Forest products	7	4
Governments	3	25
Industrial products	77	35
Information technology	5	5
Investments	9	31
Mining and metals	12	3
Public works and infrastructure	16	6
Real estate and related	322	314
Other services	246	220
Telecommunication and media	8	6
Transportation	6	137
Utilities	–	–
Other sectors	27	32
Wholesale	1,295	1,351
Acquired credit-impaired loans	6	6
Total GIL (1)	$ 2,199	$ 2,308
Canada (2)		
Residential mortgages	$ 352	$ 443
Personal	174	164
Small business	138	109
Retail	664	716
Agriculture	17	11
Automotive	6	5
Banking	1	–
Consumer discretionary	69	107
Consumer staples	40	25
Oil and gas	10	48
Financial services	4	–
Financing products	–	–
Forest products	7	4
Governments	3	25
Industrial products	28	31
Information technology	3	3
Investments	2	–
Mining and metals	4	3
Public works and infrastructure	7	5
Real estate and related	88	157
Other services	56	110
Telecommunication and media	5	5
Transportation	6	16
Utilities	–	–
Other sectors	–	–
Wholesale	356	555
Total	$ 1,020	$ 1,271
U.S. (2)		
Retail	$ 34	$ 23
Wholesale	674	412
Total	$ 708	$ 435
Other International (2)		
Retail	$ 200	$ 212
Wholesale	271	390
Total	$ 471	$ 602
Total GIL	$ 2,199	$ 2,308
Allowance on impaired loans	(669)	(697)
Net impaired loans	$ 1,530	$ 1,611
GIL as a % of loans and acceptances		
Residential mortgages	0.13%	0.17%
Personal	0.20%	0.21%
Small business	1.09%	0.91%
Retail	0.16%	0.19%
Wholesale	0.45%	0.57%
Total	0.26%	0.31%
Allowance on impaired loans as a % of GIL	30.41%	30.21%

(1) Past due loans greater than 90 days not included in impaired loans were $170 million in 2022 (2021 – $137 million). For further details, refer to Note 5 of our 2022 Annual Consolidated Financial Statements.

(2) Geographic information is based on residence of borrower.

Provision for credit losses by portfolio and geography — Table 76

For the year ended October 31 (Millions of Canadian dollars, except for percentage amounts)	2022	2021
Residential mortgages	$ 13	$ 34
Personal	259	243
Credit cards	333	296
Small business	43	31
Retail	648	604
Agriculture	$ 1	$ (5)
Automotive	3	(5)
Banking	(3)	–
Consumer discretionary	47	7
Consumer staples	35	(14)
Oil and gas	(2)	(51)
Financial services	3	2
Financing products	–	–
Forest products	1	(5)
Governments	(1)	2
Industrial products	(6)	2
Information technology	(8)	24
Investments	3	(3)
Mining and metals	9	(5)
Public works and infrastructure	5	2
Real estate and related	32	30
Other services	25	53
Telecommunication and media	(1)	9
Transportation	(16)	32
Utilities	1	(1)
Other sectors	3	(1)
Wholesale	131	73
Acquired credit–impaired loans	(1)	1
Total PCL on impaired loans	$ 778	$ 678
Canada (1)		
Residential mortgages	$ 15	$ 24
Personal	271	254
Credit cards	326	288
Small business	43	31
Retail	655	597
Agriculture	1	(4)
Automotive	3	(5)
Banking	1	–
Consumer discretionary	36	11
Consumer staples	9	–
Oil and gas	(21)	(19)
Financial services	1	–
Financing products	–	–
Forest products	1	(5)
Governments	(1)	2
Industrial products	9	2
Information technology	1	2
Investments	2	–
Mining and metals	2	–
Public works and infrastructure	–	2
Real estate and related	23	26
Other services	9	62
Telecommunication and media	1	2
Transportation	1	10
Utilities	–	–
Other sectors	–	–
Wholesale	78	86
Total	$ 733	$ 683
U.S. (1)		
Retail	$ 2	$ 7
Wholesale	68	(10)
Total	$ 70	$ (3)
Other International (1)		
Retail	$ (9)	$ –
Wholesale	(16)	(2)
Total	$ (25)	$ (2)
Total PCL on impaired loans	$ 778	$ 678
Total PCL on performing loans	(281)	(1,350)
Total PCL on other financial assets	(13)	(81)
Total PCL	$ 484	$ (753)
PCL on loans as a % of average net loans and acceptances	0.06%	(0.10)%
PCL on impaired loans as a % of average net loans and acceptances (1)	0.10%	0.10%

(1) Geographic information is based on residence of borrower.

Table of Contents

Allowance on loans by portfolio and geography (1) — Table 77

As at and for the year ended October 31 (Millions of Canadian dollars, except percentage amounts)	2022	2021
Allowance against impaired loans		
Canada (2)		
Residential mortgages	$ 44	$ 45
Personal	85	71
Small business	48	34
Retail	$ 177	$ 150
Agriculture	$ 2	$ 3
Automotive	4	1
Banking	–	–
Consumer discretionary	27	9
Consumer staples	10	5
Oil and gas	7	29
Financial services	1	–
Financing products	–	–
Forest products	1	1
Governments	1	3
Industrial products	12	9
Information technology	2	1
Investments	1	–
Mining and metals	2	1
Public works and infrastructure	4	2
Real estate and related	25	27
Other services	12	81
Telecommunication and media	1	1
Transportation	3	9
Utilities	–	–
Other sectors	–	–
Wholesale	$ 115	$ 182
Total	$ 292	$ 332
U.S. (2)		
Retail	$ 2	$ 3
Wholesale	175	126
Total	$ 177	$ 129
Other International (2)		
Retail	$ 98	$ 107
Wholesale	102	129
Total	$ 200	$ 236
Total allowance on impaired loans	$ 669	$ 697
Allowance on performing loans		
Residential mortgages	$ 300	$ 278
Personal	946	991
Credit cards	893	875
Small business	146	143
Retail	$ 2,285	$ 2,287
Wholesale	$ 1,227	$ 1,435
Total allowance on performing loans	$ 3,512	$ 3,722
Total allowance on loans	$ 4,181	$ 4,419
Key ratios		
Allowance on loans as a % of loans and acceptances	0.50%	0.60%
Net write-offs as a % of average net loans and acceptances	0.10%	0.11%

(1) Includes loans, acceptances, and commitments.
(2) Geographic information is based on residence of borrower.

Credit quality information by Canadian province (1) — **Table 78**

As at and for the year ended October 31 (Millions of Canadian dollars)	2022	2021
Loans and acceptances		
Atlantic provinces (2)	**$ 30,709**	$ 29,078
Quebec	**73,743**	68,595
Ontario	**300,477**	268,317
Alberta	**73,638**	71,506
Other Prairie provinces (3)	**35,699**	33,956
B.C. and territories (4)	**108,151**	97,937
Total loans and acceptances in Canada	**$ 622,417**	$ 569,389
Gross impaired loans		
Atlantic provinces (2)	**$ 65**	$ 97
Quebec	**172**	198
Ontario	**323**	379
Alberta	**233**	321
Other Prairie provinces (3)	**121**	173
B.C. and territories (4)	**106**	103
Total GIL in Canada	**$ 1,020**	$ 1,271
PCL on impaired loans		
Atlantic provinces (2)	**$ 20**	$ 22
Quebec	**47**	22
Ontario	**529**	483
Alberta	**48**	83
Other Prairie provinces (3)	**39**	39
B.C. and territories (4)	**50**	34
Total PCL on impaired loans in Canada	**$ 733**	$ 683

(1) Geographic information is based on residence of borrower.
(2) Comprises Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick.
(3) Comprises Manitoba and Saskatchewan.
(4) Comprises British Columbia, Nunavut, Northwest Territories and Yukon.

Table of Contents

Glossary

Acceptances
A bill of exchange or negotiable instrument drawn by the borrower for payment at maturity and accepted by a bank. The acceptance constitutes a guarantee of payment by the bank and can be traded in the money market. The bank earns a "stamping fee" for providing this guarantee.

Allowance for credit losses (ACL)
The amount deemed adequate by management to absorb expected credit losses as at the balance sheet date. The allowance is established for all financial assets subject to impairment assessment, including certain loans, debt securities, customers' liability under acceptances, financial guarantees, and undrawn loan commitments. The allowance is changed by the amount of provision for credit losses recorded, which is charged to income, and decreased by the amount of write-offs net of recoveries in the period.

Asset-backed securities (ABS)
Securities created through the securitization of a pool of assets, for example auto loans or credit card loans.

Assets under administration (AUA)
Assets administered by us, which are beneficially owned by clients, unless otherwise noted. Services provided in respect of assets under administration are of an administrative nature, including safekeeping, collecting investment income, settling purchase and sale transactions, and record keeping.

Assets under management (AUM)
Assets managed by us, which are beneficially owned by clients, unless otherwise noted. Services provided in respect of assets under management include the selection of investments and the provision of investment advice. We have assets under management that are also administered by us and included in assets under administration.

Attributed capital
Attributed capital is based on the Basel III regulatory capital requirements and economic capital.

Auction rate securities (ARS)
Debt securities whose interest rates are regularly reset through an auction process.

Average earning assets, net
Average earning assets include interest-bearing deposits with other banks, securities, net of applicable allowance, assets purchased under reverse repurchase agreements and securities borrowed, loans, net of allowance, cash collateral and margin deposits. Insurance assets, and all other assets not specified are excluded. The averages are based on the daily balances for the period.

Basis point (bp)
One one-hundredth of a percentage point (.01%).

Collateral
Assets pledged as security for a loan or other obligation. Collateral can take many forms, such as cash, highly rated securities, property, inventory, equipment and receivables.

Collateralized debt obligation (CDO)
Securities with multiple tranches that are issued by structured entities and collateralized by debt obligations including bonds and loans. Each tranche offers a varying degree of risk and return so as to meet investor demand.

Commercial mortgage-backed securities (CMBS)
Securities created through the securitization of commercial mortgages.

Commitments to extend credit
Unutilized amount of credit facilities available to clients either in the form of loans, bankers' acceptances and other on-balance sheet financing, or through off-balance sheet products such as guarantees and letters of credit.

Common Equity Tier 1 (CET1) capital
A regulatory Basel III capital measure comprised mainly of common shareholders' equity less regulatory deductions and adjustments for goodwill and intangibles, defined benefit pension fund assets, shortfall in allowances and other specified items.

Common Equity Tier 1 capital ratio
A risk-based capital measure calculated as CET1 capital divided by risk-weighted assets.

Covered bonds
Full recourse on-balance sheet obligations issued by banks and credit institutions that are fully collateralized by assets over which investors enjoy a priority claim in the event of an issuer's insolvency.

Credit default swaps (CDS)
A derivative contract that provides the purchaser with a one-time payment should the referenced entity/entities default (or a similar triggering event occur).

Derivative
A contract between two parties, which requires little or no initial investment and where payments between the parties are dependent upon the movements in price of an underlying instrument, index or financial rate. Examples of derivatives include swaps, options, forward rate agreements and futures. The notional amount of the derivative is the contract amount used as a reference point to calculate the payments to be exchanged between the two parties, and the notional amount itself is generally not exchanged by the parties.

Dividend payout ratio
Common dividends as a percentage of net income available to common shareholders.

Dividend yield
Dividends per common share divided by the average of the high and low share price in the relevant period.

Earnings per share (EPS), basic
Calculated as net income available to common shareholders divided by the average number of shares outstanding.

Earnings per share (EPS), diluted
Calculated as net income available to common shareholders divided by the average number of shares outstanding adjusted for the dilutive effects of stock options and other convertible securities.

Efficiency Ratio
Non-interest expense as a percentage of total revenue.

Expected credit losses
The difference between the contractual cash flows due to us in accordance with the relevant contractual terms and the cash flows that we expect to receive, discounted to the balance sheet date.

Fair value
Fair value of a financial instrument is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Funding Valuation Adjustment
Funding valuation adjustments are calculated to incorporate cost and benefit of funding in the valuation of uncollateralized and under-collateralized OTC derivatives. Future expected cash flows of these derivatives are discounted to reflect the cost and benefit of funding the derivatives by using a funding curve, implied volatilities and correlations as inputs.

Guarantees and standby letters of credit
These primarily represent irrevocable assurances that a bank will make payments in the event that its client cannot meet its financial obligations to third parties. Certain other guarantees, such as bid and performance bonds, represent non-financial undertakings.

Hedge
A risk management technique used to mitigate exposure from market, interest rate or foreign currency exchange risk arising from normal banking operations. The elimination or reduction of such exposure is accomplished by establishing offsetting positions. For example, assets denominated in foreign currencies can be offset with liabilities in the same currencies or through the use of foreign exchange hedging instruments such as futures, options or foreign exchange contracts.

Hedge funds
A type of investment fund, marketed to accredited high net worth investors, that is subject to limited regulation and restrictions on its investments compared to retail mutual funds, and that often utilize aggressive strategies such as selling short, leverage, program trading, swaps, arbitrage and derivatives.

High-quality liquid assets (HQLA)
Assets are considered to be HQLA if they can be easily and immediately converted into cash at little or no loss of value during a time of stress.

Impaired loans
Loans are classified as impaired when there has been a deterioration of credit quality to the extent that management no longer has reasonable assurance of timely collection of the full amount of principal and interest in accordance with the contractual terms of the loan agreement. Credit card balances are not classified as impaired as they are directly written off after payments are 180 days past due.

International Financial Reporting Standards (IFRS)
IFRS are principles-based standards, interpretations and the framework adopted by the International Accounting Standards Board.

Leverage Ratio
A Basel III regulatory measure, the ratio divides Tier 1 capital by the sum of total assets plus specified off-balance sheet items.

Liquidity Coverage Ratio (LCR)
The Liquidity Coverage Ratio is a Basel III metric that measures the sufficiency of HQLA available to meet net short-term financial obligations over a thirty day period in an acute stress scenario.

Loan-to-value (LTV) ratio
Calculated based on the total facility amount for the residential mortgage and RBC Homeline Plan® product divided by the value of the related residential property.

Master netting agreement
An agreement between us and a counterparty designed to reduce the credit risk of multiple derivative transactions through the creation of a legal right of offset of exposure in the event of a default.

Net interest income
The difference between what is earned on assets such as loans and securities and what is paid on liabilities such as deposits and subordinated debentures.

Net interest margin (on average earning assets, net)
Calculated as net interest income divided by average earning assets, net.

Net Stable Funding Ratio (NSFR)
The Net Stable Funding Ratio is a Basel III metric that measures the sufficiency of available stable funding to meet the minimum coverage level of required stable funding.

Normal course issuer bid (NCIB)
A program for the repurchase of our own shares for cancellation through a stock exchange that is subject to the various rules of the relevant stock exchange and securities commission.

Notional amount
The contract amount used as a reference point to calculate payments for derivatives.

Off-balance sheet financial instruments
A variety of arrangements offered to clients, which include credit derivatives, written put options, backstop liquidity facilities, stable value products, financial standby letters of credit, performance guarantees, credit enhancements, mortgage loans sold with recourse, commitments to extend credit, securities lending, documentary and commercial letters of credit, sponsor member guarantees, securities lending indemnifications and indemnifications.

Office of the Superintendent of Financial Institutions Canada (OSFI)
The primary regulator of federally chartered financial institutions and federally administered pension plans in Canada. OSFI's mission is to safeguard policyholders, depositors and pension plan members from undue loss.

Operating leverage
The difference between our revenue growth rate and non-interest expense growth rate.

Options
A contract or a provision of a contract that gives one party (the option holder) the right, but not the obligation, to perform a specified transaction with another party (the option issuer or option writer) according to specified terms.

Provision for credit losses (PCL)
The amount charged to income necessary to bring the allowance for credit losses to a level determined appropriate by management. This includes provisions on performing and impaired financial assets.

PCL on loans ratio
PCL on loans ratio is calculated using PCL on loans as a percentage of average net loans and acceptances.

RBC Homeline Plan® products
This is comprised of residential mortgages and secured personal loans whereby the borrower pledges real estate as collateral.

Repurchase agreements
These involve the sale of securities for cash and the simultaneous repurchase of the securities for value at a later date. These transactions normally do not constitute economic sales and therefore are treated as collateralized financing transactions.

Return on common equity (ROE)
Net income available to common shareholders, expressed as a percentage of average common equity.

Reverse repurchase agreements
These involve the purchase of securities for cash and the simultaneous sale of the securities for value at a later date. These transactions normally do not constitute economic sales and therefore are treated as collateralized financing transactions.

Risk-weighted assets (RWA)
Assets adjusted by a regulatory risk-weight factor to reflect the riskiness of on and off-balance sheet exposures. Certain assets are not risk-weighted, but deducted from capital. The calculation is defined by OSFI's Capital Adequacy Requirements guidelines. For more details, refer to the Capital management section.

Securities lending
Transactions in which the owner of securities agrees to lend it under the terms of a prearranged contract to a borrower for a fee. Collateral for the loan consists of either high quality securities or cash and collateral value must be at least equal to the market value of the loaned securities. Borrowers pay a negotiated fee for loans collateralized by securities, whereas for cash collateral lenders pay borrowers interest at a negotiated rate and reinvest the cash collateral to earn a return. An intermediary such as a bank often acts as agent lender for the owner of the security in return for a share of the revenue earned by the owner from lending securities. Most often, agent lenders indemnify the owner against the risk of the borrower's failure to redeliver the loaned securities – counterparty credit risk if a borrower defaults and market risk if the value of the non-cash collateral declines. The agent lender does not indemnify against the investment risk of re-investing cash collateral which is borne by the owner.

Securities sold short
A transaction in which the seller sells securities and then borrows the securities in order to deliver them to the purchaser upon settlement. At a later date, the seller buys identical securities in the market to replace the borrowed securities.

Securitization
The process by which various financial assets are packaged into newly issued securities backed by these assets.

Standardized Approach
Risk weights prescribed by OSFI are used to calculate RWA for the credit risk exposures. Credit assessments by OSFI-recognized external credit rating agencies of S&P, Moody's, Fitch and DBRS are used to risk-weight our Sovereign and Bank exposures based on the standards and guidelines issued by OSFI. For our Business and Retail exposures, we use the standard risk weights prescribed by OSFI.

Structured entities
A structured entity is an entity in which voting or similar rights are not the dominant factor in deciding who controls the entity, such as when the activities that significantly affect the entity's returns are directed by means of contractual arrangements. Structured entities often have restricted activities, narrow and well defined objectives, insufficient equity to finance their activities, and financing in the form of multiple contractually-linked instruments.

Taxable equivalent basis (teb)
Income from certain specified tax advantaged sources (eligible Canadian taxable corporate dividends) is increased to a level that would make it comparable to income from taxable sources. There is an offsetting adjustment in the tax provision, thereby generating the same after-tax net income.

Tier 1 capital
Tier 1 capital comprises predominantly of CET1 capital, with additional Tier 1 items such as preferred shares, limited recourse capital notes and non-controlling interests in subsidiaries Tier 1 instruments.

Tier 2 capital
Tier 2 capital consists mainly of subordinated debentures that meet certain criteria, certain loan loss allowances and non-controlling interests in subsidiaries' Tier 2 instruments.

Total Loss Absorbing Capacity (TLAC)
The aggregate of Tier 1 capital, Tier 2 capital, and external TLAC instruments which allow conversion in whole or in part into common shares under the Canada Deposit Insurance Corporation Act and meet all of the eligibility criteria under the TLAC guideline.

TLAC ratio
The risk-based TLAC ratio is defined as TLAC divided by total risk-weighted assets.

TLAC Leverage Ratio
The TLAC leverage ratio is defined as TLAC divided by the Leverage ratio exposure.

Total capital and total capital ratio
Total capital is defined as the total of Tier 1 and Tier 2 capital. The total capital ratio is calculated by dividing total capital by risk-weighted assets.

Tranche
A security class created whereby the risks and returns associated with a pool of assets are packaged into several classes of securities offering different risk and return profiles from those of the underlying asset pool. Tranches are typically rated by ratings agencies, and reflect both the credit quality of underlying collateral as well as the level of protection based on the tranches' relative subordination.

Unattributed capital
Unattributed capital represents common equity in excess of common equity attributed to our business segments and is reported in the Corporate Support segment.

Value-at-Risk (VaR)
A generally accepted risk-measurement concept that uses statistical models based on historical information to estimate within a given level of confidence the maximum loss in market value we would experience in our trading portfolio from an adverse one-day movement in market rates and prices.

Table of Contents

EDTF recommendations index

We aim to present transparent, high-quality risk disclosures by providing disclosures in this 2022 Annual Report and Supplementary Financial Information package (SFI), and Pillar 3 Report, in accordance with recommendations from the FSB's Enhanced Disclosure Task Force (EDTF). Information within the SFI and Pillar 3 Report is not and should not be considered incorporated by reference into this 2022 Annual Report.

The following index summarizes our disclosure by EDTF recommendation:

			Location of disclosure	
Type of Risk	**Recommendation**	**Disclosure**	**Annual Report page**	**SFI page**
General	1	Table of contents for EDTF risk disclosure	128	1
	2	Define risk terminology and measures	60-65, 126-127	–
	3	Top and emerging risks	58-60	–
	4	New regulatory ratios	105-110	–
Risk governance, risk management and business model	5	Risk management organization	60-65	–
	6	Risk culture	60-65	–
	7	Risk in the context of our business activities	113	–
	8	Stress testing	63-64, 76	–
Capital adequacy and risk-weighted assets (RWA)	9	Minimum Basel III capital ratios and Domestic systemically important bank surcharge	105-110	–
	10	Composition of capital and reconciliation of the accounting balance sheet to the regulatory balance sheet	–	*
	11	Flow statement of the movements in regulatory capital	–	20
	12	Capital strategic planning	105-110	–
	13	RWA by business segments	–	21
	14	Analysis of capital requirement, and related measurement model information	66-69	*
	15	RWA credit risk and related risk measurements	–	*
	16	Movement of risk-weighted assets by risk type	–	21
	17	Basel back-testing	63, 66-67	32
Liquidity	18	Quantitative and qualitative analysis of our liquidity reserve	83-84, 88-89	–
Funding	19	Encumbered and unencumbered assets by balance sheet category, and contractual obligations for rating downgrades	84, 87	–
	20	Maturity analysis of consolidated total assets, liabilities and off-balance sheet commitments analyzed by remaining contractual maturity at the balance sheet date	91-92	–
	21	Sources of funding and funding strategy	84-86	–
Market risk	22	Relationship between the market risk measures for trading and non-trading portfolios and the balance sheet	80-81	–
	23	Decomposition of market risk factors	76-81	–
	24	Market risk validation and back-testing	76	–
	25	Primary risk management techniques beyond reported risk measures and parameters	76-79	–
Credit risk	26	Bank's credit risk profile	66-75, 175-182	22-32, *
		Quantitative summary of aggregate credit risk exposures that reconciles to the balance sheet	120-125	*
	27	Policies for identifying impaired loans	68-70, 115, 147-149	–
	28	Reconciliation of the opening and closing balances of impaired loans and impairment allowances during the year	–	24, 29
	29	Quantification of gross notional exposure for OTC derivatives or exchange-traded derivatives	71	33
	30	Credit risk mitigation, including collateral held for all sources of credit risk	69-70	*
Other	31	Other risk types	94-104	–
	32	Publicly known risk events	98-99, 219-220	–

* These disclosure requirements are satisfied or partially satisfied by disclosures provided in our Pillar 3 Report for the quarter ended October 31, 2022 and for the year ended October 31, 2021.

Table of Contents

REPORTS AND CONSOLIDATED FINANCIAL STATEMENTS

Reports

130 Management's Responsibility for Financial Reporting

130 Management's Report on Internal Control over Financial Reporting

135 Report of Independent Registered Public Accounting Firm (PCAOB ID 271)

Consolidated Financial Statements

138 Consolidated Balance Sheets

139 Consolidated Statements of Income

140 Consolidated Statements of Comprehensive Income

141 Consolidated Statements of Changes in Equity

142 Consolidated Statements of Cash Flows

Notes to Consolidated Financial Statements

143 Note 1 General information

143 Note 2 Summary of significant accounting policies, estimates and judgments

158 Note 3 Fair value of financial instruments

171 Note 4 Securities

175 Note 5 Loans and allowance for credit losses

182 Note 6 Significant acquisition

182 Note 7 Derecognition of financial assets

183 Note 8 Structured entities

187 Note 9 Derivative financial instruments and hedging activities

197 Note 10 Premises and equipment

198 Note 11 Goodwill and other intangible assets

200 Note 12 Joint ventures and associated companies

200 Note 13 Other assets

201 Note 14 Deposits

201 Note 15 Insurance

204 Note 16 Segregated funds

204 Note 17 Employee benefits – Pension and other post-employment benefits

209 Note 18 Other liabilities

209 Note 19 Subordinated debentures

210 Note 20 Equity

212 Note 21 Share-based compensation

214 Note 22 Income taxes

216 Note 23 Earnings per share

217 Note 24 Guarantees, commitments, pledged assets and contingencies

219 Note 25 Legal and regulatory matters

220 Note 26 Related party transactions

222 Note 27 Results by business segment

223 Note 28 Nature and extent of risks arising from financial instruments

224 Note 29 Capital management

225 Note 30 Offsetting financial assets and financial liabilities

227 Note 31 Recovery and settlement of on-balance sheet assets and liabilities

228 Note 32 Parent company information

229 Note 33 Subsequent events

Management's Responsibility for Financial Reporting

The accompanying consolidated financial statements of Royal Bank of Canada were prepared by management, which is responsible for the integrity and fairness of the information presented, including the many amounts that must of necessity be based on estimates and judgments. These consolidated financial statements were prepared in accordance with the *Bank Act* (Canada) and International Financial Reporting Standards as issued by the International Accounting Standards Board. Financial information appearing throughout our Management's Discussion and Analysis is consistent with these consolidated financial statements.

Our internal controls are designed to provide reasonable assurance that transactions are authorized, assets are safeguarded and proper records are maintained. These controls include quality standards in hiring and training of employees, policies and procedures manuals, a corporate code of conduct and accountability for performance within appropriate and well-defined areas of responsibility.

The system of internal controls is further supported by a compliance function, which is designed to ensure that we and our employees comply with securities legislation and conflict of interest rules, and by an internal audit staff, which conducts periodic audits of all aspects of our operations.

The Board of Directors oversees management's responsibilities for financial reporting through an Audit Committee, which is composed entirely of independent directors. This Committee reviews our consolidated financial statements and recommends them to the Board for approval. Other key responsibilities of the Audit Committee include reviewing our existing internal control procedures and planned revisions to those procedures, and advising the directors on auditing matters and financial reporting issues. Our Chief Compliance Officer and Chief Internal Auditor have full and unrestricted access to the Audit Committee.

The Office of the Superintendent of Financial Institutions Canada (OSFI) examines and inquires into our business and affairs as deemed necessary to determine whether the provisions of the *Bank Act* are being complied with, and that we are in sound financial condition. In carrying out its mandate, OSFI strives to protect the rights and interests of our depositors and creditors.

PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm appointed by our shareholders upon the recommendation of the Audit Committee and Board, has performed an independent audit of the consolidated financial statements in accordance with Canadian generally accepted auditing standards and the standards of the Public Company Accounting Oversight Board (United States) as stated in their Independent Auditor's Report and Report of Independent Registered Public Accounting Firm, respectively. The auditors have full and unrestricted access to the Audit Committee to discuss their audit and related findings.

David I. McKay
President and Chief Executive Officer

Nadine Ahn
Chief Financial Officer

Toronto, November 29, 2022

Management's Report on Internal Control over Financial Reporting

Management of Royal Bank of Canada is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is a process designed by, or under the supervision of, the President and Chief Executive Officer and Chief Financial Officer and effected by the Board of Directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with International Financial Reporting Standards as issued by the International Accounting Standards Board. It includes those policies and procedures that:

- Pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions related to and dispositions of our assets;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and our receipts and expenditures are made only in accordance with authorizations of our management and directors; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of our assets that could have a material effect on our financial statements.

Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements on a timely basis. Also, projections of any evaluation of the effectiveness of internal control over financial reporting to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management evaluated, under the supervision of and with the participation of the President and Chief Executive Officer and Chief Financial Officer, the effectiveness of our internal control over financial reporting as of October 31, 2022, based on the criteria set forth in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on that evaluation, management concluded that, as of October 31, 2022, internal control over financial reporting was effective based on the criteria established in the *Internal Control – Integrated Framework (2013)*.

The effectiveness of our internal control over financial reporting as of October 31, 2022, has been audited by PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm, as stated in their Report of Independent
Registered Public Accounting Firm, which appears herein.

David I. McKay
President and Chief Executive Officer

Nadine Ahn
Chief Financial Officer

Toronto, November 29, 2022

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of Royal Bank of Canada

Opinions on the Financial Statements and Internal Control over Financial Reporting
We have audited the accompanying consolidated balance sheets of Royal Bank of Canada and its subsidiaries (together, the Bank) as of October 31, 2022 and 2021, and the related consolidated statements of income, comprehensive income, changes in equity and cash flows for the years then ended, including the related notes (collectively referred to as the consolidated financial statements). We also have audited the Bank's internal control over financial reporting as of October 31, 2022, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Bank as of October 31, 2022 and 2021, and its financial performance and its cash flows for the years then ended in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board. Also in our opinion, the Bank maintained, in all material respects, effective internal control over financial reporting as of October 31, 2022, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the COSO.

Basis for Opinions
The Bank's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express opinions on the Bank's consolidated financial statements and on the Bank's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Bank in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting
An entity's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. An entity's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the entity; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the entity are being made only in accordance with authorizations of management and directors of the entity; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the entity's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters
The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Allowance for Credit Losses for Financial Assets Categorized as Stage 1 and Stage 2 (Stage 1 and Stage 2 ACL)
As described in Notes 2, 4 and 5 to the consolidated financial statements, the Bank's allowance for credit losses for financial assets was $4,214 million as of October 31, 2022 and represents management's estimate of expected credit losses on financial assets as of the balance sheet date, of which a significant portion relates to financial assets categorized as Stage 1 and Stage 2. Performing financial assets are categorized as Stage 1 from initial recognition to the date on which the asset has experienced a significant increase in credit risk relative to its initial recognition. Performing financial assets transfer into Stage 2 following a significant increase in credit risk relative to the initial recognition. Financial assets are categorized as Stage 3 when considered

to be credit-impaired. As disclosed by management, the measurement of expected credit losses is a complex calculation that involves a large number of interrelated inputs and assumptions such as borrower risk ratings, forward-looking macroeconomic conditions, scenario design and the weights assigned to each scenario. The probability of default, loss given default and exposure at default inputs are modelled based on the macroeconomic variables that are most closely correlated with credit losses. Management's estimation of expected credit losses in Stage 1 and Stage 2 considers five distinct future macroeconomic scenarios, each of which includes a forecast of relevant macroeconomic variables, designed to capture a wide range of possible outcomes and which are probability-weighted according to management's expectation of the relative likelihood of the range of outcomes that each scenario represents at the reporting date. Significant management judgment is required in making assumptions and estimations when calculating the Stage 1 and Stage 2 ACL.

The principal considerations for our determination that performing procedures relating to the Stage 1 and Stage 2 ACL is a critical audit matter are (i) the significant judgment required by management when estimating the Stage 1 and Stage 2 ACL; (ii) a high degree of auditor judgment and subjectivity in performing procedures related to management's assumptions for (a) designing future macroeconomic scenarios, (b) forecasting certain macroeconomic variables, (c) probability-weighting scenarios, and (d) assigning borrower risk ratings; (iii) the significant audit effort necessary to evaluate audit evidence as the estimation of the Stage 1 and Stage 2 ACL is a complex calculation that involves a large volume of data, interrelated inputs and assumptions, some of which are model-based; and (iv) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the estimation of the Stage 1 and Stage 2 ACL, including controls over (i) the probability of default, loss given default and exposure at default models; (ii) the design of future macroeconomic scenarios, the forecasting of certain macroeconomic variables, and the probability-weighting of these scenarios; (iii) the assignment of borrower risk ratings; and (iv) the completeness and accuracy of certain data inputs underlying the Stage 1 and Stage 2 ACL calculation. These procedures also included, among others, testing management's process for estimating the Stage 1 and Stage 2 ACL. This consisted of (i) testing the completeness and accuracy of certain underlying data used in the estimation of the Stage 1 and Stage 2 ACL; and (ii) with the assistance of professionals with specialized skill and knowledge, evaluating (a) the appropriateness of the probability of default, loss given default and exposure at default models used in the estimation of the Stage 1 and Stage 2 ACL, and (b) the reasonableness of significant inputs and assumptions used in the estimation of the Stage 1 and Stage 2 ACL related to (1) the design of future macroeconomic scenarios, (2) certain forecasted macroeconomic variables, (3) the probability-weights assigned to the scenarios, and (4) the assignment of borrower risk ratings for samples of loans.

Goodwill Impairment Assessment of the Caribbean Banking Cash Generating Unit (CGU)
As described in Notes 2 and 11 to the consolidated financial statements, the goodwill allocated to the Caribbean Banking CGU was $1,759 million. Management conducts a goodwill impairment test as of August 1 of each year by comparing the carrying amount of each CGU to its recoverable amount. The recoverable amount of a CGU is represented by its value in use (VIU), except in circumstances where the carrying amount of a CGU exceeds its VIU. In such cases, the greater of the CGU's fair value less costs of disposal (FVLCD) and its VIU is the recoverable amount. Management estimated the recoverable amount of the Caribbean Banking CGU based on its FVLCD. Management calculated the FVLCD using a discounted cash flow method that projects future cash flows over a 5-year period based on management forecasts, adjusted to approximate the considerations of a prospective third-party buyer. Cash flows beyond the initial 5-year period are assumed by management to increase at a constant rate using a nominal long-term growth rate. The discount rate used to determine the present value of the Caribbean Banking CGU's projected future cash flows is based on the bank-wide cost of capital, adjusted for the risks to which the CGU is exposed. As of August 1, 2022, management determined that the recoverable amount was 109% of its carrying amount. Management also considered reasonably possible alternative scenarios, including market comparable transactions, which yielded valuations ranging from an immaterial deficit to an immaterial surplus. Management uses significant judgment to determine inputs to the discounted cash flow model. If the future cash flows and other assumptions in future periods deviate significantly from the current amounts used in management's impairment testing, the value of goodwill could become impaired.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessment of the Caribbean Banking CGU is a critical audit matter are (i) the significant judgment required by management when determining the recoverable amount of the CGU, including projecting future cash flows; (ii) a high degree of auditor judgment and subjectivity in performing procedures and evaluating audit evidence related to management's calculation of the recoverable amount of the CGU; and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management's goodwill impairment test, including controls over the determination of the recoverable amount of the Caribbean Banking CGU. These procedures also included, among others, testing management's process for determining the recoverable amount of the CGU which consisted of (i) evaluating the appropriateness of the discounted cash flow model; (ii) testing the completeness and accuracy of certain underlying data used in the model; (iii) evaluating the reasonableness of certain assumptions used by management related to future cash flows, which involved evaluating the consistency with (a) current and past performance of the CGU, and (b) external market and industry data; and (iv) evaluating consistency of the recoverable amount with market comparable transactions. Professionals with specialized skill and knowledge were used to assist in evaluating the appropriateness of management's discounted cash flow model and the consistency of the recoverable amount of the CGU with market comparable transactions.

Uncertain Tax Positions
As described in Note 2 to the consolidated financial statements, the Bank is subject to income tax laws in various jurisdictions where it operates and the complex tax laws are potentially subject to different interpretations by management and the relevant taxation authorities. As disclosed by management, significant judgment is required in the interpretation of the relevant tax laws, and in assessing the probability of acceptance of the Bank's tax positions to determine tax provisions, which includes

management's best estimate of uncertain tax positions that are under audit or appeal by the relevant taxation authorities. Management performs a review on a quarterly basis to incorporate its best assessment based on information available, but additional liability and income tax expense could result based on the acceptance of the Bank's tax positions by the relevant tax authorities. In some cases, as described in Note 22 to the consolidated financial statements, the Bank has received reassessments denying the tax deductibility of dividends from transactions including those with Tax Indifferent Investors.

The principal considerations for our determination that performing procedures relating to uncertain tax positions is a critical audit matter are (i) the significant judgment required by management, including a high degree of estimation uncertainty, when (a) interpreting the relevant tax laws, and (b) assessing the probability of acceptance of the Bank's tax positions, which includes management's best estimate of uncertain tax positions that are under audit or appeal by relevant taxation authorities; (ii) a high degree of auditor judgment and subjectivity in performing procedures and evaluating the uncertain tax positions; and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the evaluation of uncertain tax positions and the impact on tax provisions. These procedures also included, among others, testing management's process for (i) assessing the probability of acceptance of the Bank's tax positions; and (ii) estimating provisions relating to uncertain tax positions, if applicable, which reflects management's best estimate of uncertain tax positions that are under audit or appeal by relevant taxation authorities. This consisted of (i) evaluating the appropriateness of the methods used; (ii) testing the completeness and accuracy of underlying data used in the estimate; (iii) reviewing correspondence with relevant taxation authorities; (iv) making inquiries of the Bank's internal and external legal counsel; and (v) evaluating, with the assistance of professionals with specialized skill and knowledge, the application of relevant tax laws, the reasonableness of management's assessment of whether it is probable that the relevant tax authorities will accept the Bank's tax positions, and evidence used by management.

/s/ PricewaterhouseCoopers LLP

Chartered Professional Accountants, Licensed Public Accountants
Toronto, Canada
November 29, 2022

We have served as the Bank's auditor since 2016.

Table of Contents

Consolidated Balance Sheets

(Millions of Canadian dollars)	As at October 31 2022	October 31 2021
Assets		
Cash and due from banks	**$ 72,397**	$ 113,846
Interest-bearing deposits with banks	**108,011**	79,638
Securities (Note 4)		
Trading	**148,205**	139,240
Investment, net of applicable allowance	**170,018**	145,484
	318,223	284,724
Assets purchased under reverse repurchase agreements and securities borrowed	**317,845**	307,903
Loans (Note 5)		
Retail	**549,751**	503,598
Wholesale	**273,967**	218,066
	823,718	721,664
Allowance for loan losses (Note 5)	**(3,753)**	(4,089)
	819,965	717,575
Segregated fund net assets (Note 16)	**2,638**	2,666
Other		
Customers' liability under acceptances	**17,827**	19,798
Derivatives (Note 9)	**154,439**	95,541
Premises and equipment (Note 10)	**7,214**	7,424
Goodwill (Note 11)	**12,277**	10,854
Other intangibles (Note 11)	**6,083**	4,471
Other assets (Note 13)	**80,300**	61,883
	278,140	199,971
Total assets	**$ 1,917,219**	$ 1,706,323
Liabilities and equity		
Deposits (Note 14)		
Personal	**$ 404,932**	$ 362,488
Business and government	**759,870**	696,353
Bank	**44,012**	41,990
	1,208,814	1,100,831
Segregated fund net liabilities (Note 16)	**2,638**	2,666
Other		
Acceptances	**17,872**	19,873
Obligations related to securities sold short	**35,511**	37,841
Obligations related to assets sold under repurchase agreements and securities loaned	**273,947**	262,201
Derivatives (Note 9)	**153,491**	91,439
Insurance claims and policy benefit liabilities (Note 15)	**11,511**	12,816
Other liabilities (Note 18)	**95,235**	70,301
	587,567	494,471
Subordinated debentures (Note 19)	**10,025**	9,593
Total liabilities	**1,809,044**	1,607,561
Equity attributable to shareholders		
Preferred shares and other equity instruments (Note 20)	**7,318**	6,684
Common shares (Note 20)	**16,984**	17,655
Retained earnings	**78,037**	71,795
Other components of equity	**5,725**	2,533
	108,064	98,667
Non-controlling interests	**111**	95
Total equity	**108,175**	98,762
Total liabilities and equity	**$ 1,917,219**	$ 1,706,323

The accompanying notes are an integral part of these Consolidated Financial Statements.

David I. McKay
President and Chief Executive Officer

Frank Vettese
Director

Consolidated Statements of Income

(Millions of Canadian dollars, except per share amounts)	For the year ended October 31 2022	October 31 2021
Interest and dividend income (Note 3)		
Loans	$ 26,565	$ 21,654
Securities	7,062	4,877
Assets purchased under reverse repurchase agreements and securities borrowed	5,447	1,309
Deposits and other	1,697	305
	40,771	28,145
Interest expense (Note 3)		
Deposits and other	10,751	5,448
Other liabilities	7,015	2,516
Subordinated debentures	288	179
	18,054	8,143
Net interest income	22,717	20,002
Non-interest income		
Insurance premiums, investment and fee income (Note 15)	3,510	5,600
Trading revenue	926	1,183
Investment management and custodial fees	7,610	7,132
Mutual fund revenue	4,289	4,251
Securities brokerage commissions	1,481	1,538
Service charges	1,976	1,858
Underwriting and other advisory fees	2,058	2,692
Foreign exchange revenue, other than trading	1,038	1,066
Card service revenue	1,203	1,078
Credit fees	1,512	1,530
Net gains on investment securities	43	145
Share of profit in joint ventures and associates (Note 12)	110	130
Other	512	1,488
	26,268	29,691
Total revenue	48,985	49,693
Provision for credit losses (Notes 4 and 5)	484	(753)
Insurance policyholder benefits, claims and acquisition expense (Note 15)	1,783	3,891
Non-interest expense		
Human resources (Note 17 and 21)	16,528	16,539
Equipment	2,099	1,986
Occupancy	1,554	1,584
Communications	1,082	931
Professional fees	1,511	1,351
Amortization of other intangibles (Note 11)	1,369	1,287
Other	2,466	2,246
	26,609	25,924
Income before income taxes	20,109	20,631
Income taxes (Note 22)	4,302	4,581
Net income	$ 15,807	$ 16,050
Net income attributable to:		
Shareholders	$ 15,794	$ 16,038
Non-controlling interests	13	12
	$ 15,807	$ 16,050
Basic earnings per share (in dollars) (Note 23)	$ 11.08	$ 11.08
Diluted earnings per share (in dollars) (Note 23)	11.06	11.06
Dividends per common share (in dollars)	4.96	4.32

The accompanying notes are an integral part of these Consolidated Financial Statements.

Consolidated Statements of Comprehensive Income

(Millions of Canadian dollars)	For the year ended October 31 2022	October 31 2021
Net income	**$ 15,807**	$ 16,050
Other comprehensive income (loss), net of taxes (Note 22)		
Items that will be reclassified subsequently to income:		
Net change in unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income		
Net unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income	**(2,241)**	177
Provision for credit losses recognized in income	**(16)**	(9)
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	**(12)**	(117)
	(2,269)	51
Foreign currency translation adjustments		
Unrealized foreign currency translation gains (losses)	**5,091**	(4,316)
Net foreign currency translation gains (losses) from hedging activities	**(1,449)**	1,740
Reclassification of losses (gains) on foreign currency translation to income	**(18)**	(7)
Reclassification of losses (gains) on net investment hedging activities to income	**17**	(1)
	3,641	(2,584)
Net change in cash flow hedges		
Net gains (losses) on derivatives designated as cash flow hedges	**1,634**	1,373
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	**194**	272
	1,828	1,645
Items that will not be reclassified subsequently to income:		
Remeasurements of employee benefit plans	**821**	2,251
Net fair value change due to credit risk on financial liabilities designated at fair value through profit or loss	**1,747**	55
Net gains (losses) on equity securities designated at fair value through other comprehensive income	**50**	38
	2,618	2,344
Total other comprehensive income (loss), net of taxes	**5,818**	1,456
Total comprehensive income (loss)	**$ 21,625**	$ 17,506
Total comprehensive income attributable to:		
Shareholders	**$ 21,604**	$ 17,501
Non-controlling interests	**21**	5
	$ 21,625	$ 17,506

The accompanying notes are an integral part of these Consolidated Financial Statements.

Consolidated Statements of Changes in Equity

(Millions of Canadian dollars)	Preferred shares and other equity instruments	Common shares	Treasury – preferred shares and other equity instruments	Treasury – common shares	Retained earnings	Other components of equity: FVOCI securities and loans	Other components of equity: Foreign currency translation	Other components of equity: Cash flow hedges	Other components of equity: Total other components of equity	Equity attributable to shareholders	Non-controlling interests	Total equity
For the year ended October 31, 2022												
Balance at beginning of period	**$ 6,723**	**$ 17,728**	**$ (39)**	**$ (73)**	**$ 71,795**	**$ (88)**	**$ 2,055**	**$ 566**	**$ 2,533**	**$ 98,667**	**$ 95**	**$ 98,762**
Changes in equity												
Issues of share capital and other equity instruments	**750**	**99**	**–**	**–**	**(1)**	**–**	**–**	**–**	**–**	**848**	**–**	**848**
Common shares purchased for cancellation	**–**	**(509)**	**–**	**–**	**(4,917)**	**–**	**–**	**–**	**–**	**(5,426)**	**–**	**(5,426)**
Redemption of preferred shares and other equity instruments	**(150)**	**–**	**–**	**–**	**(5)**	**–**	**–**	**–**	**–**	**(155)**	**–**	**(155)**
Sales of treasury shares and other equity instruments	**–**	**–**	**552**	**4,922**	**–**	**–**	**–**	**–**	**–**	**5,474**	**–**	**5,474**
Purchases of treasury shares and other equity instruments	**–**	**–**	**(518)**	**(5,183)**	**–**	**–**	**–**	**–**	**–**	**(5,701)**	**–**	**(5,701)**
Share-based compensation awards	**–**	**–**	**–**	**–**	**2**	**–**	**–**	**–**	**–**	**2**	**–**	**2**
Dividends on common shares	**–**	**–**	**–**	**–**	**(6,946)**	**–**	**–**	**–**	**–**	**(6,946)**	**–**	**(6,946)**
Dividends on preferred shares and distributions on other equity instruments	**–**	**–**	**–**	**–**	**(247)**	**–**	**–**	**–**	**–**	**(247)**	**(5)**	**(252)**
Other	**–**	**–**	**–**	**–**	**(56)**	**–**	**–**	**–**	**–**	**(56)**	**–**	**(56)**
Net income	**–**	**–**	**–**	**–**	**15,794**	**–**	**–**	**–**	**–**	**15,794**	**13**	**15,807**
Total other comprehensive income (loss), net of taxes	**–**	**–**	**–**	**–**	**2,618**	**(2,269)**	**3,633**	**1,828**	**3,192**	**5,810**	**8**	**5,818**
Balance at end of period	**$ 7,323**	**$ 17,318**	**$ (5)**	**$ (334)**	**$ 78,037**	**$ (2,357)**	**$ 5,688**	**$ 2,394**	**$ 5,725**	**$ 108,064**	**$ 111**	**$ 108,175**

(Millions of Canadian dollars)	Preferred shares and other equity instruments	Common shares	Treasury – preferred shares and other equity instruments	Treasury – common shares	Retained earnings	Other components of equity: FVOCI securities and loans	Other components of equity: Foreign currency translation	Other components of equity: Cash flow hedges	Other components of equity: Total other components of equity	Equity attributable to shareholders	Non-controlling interests	Total equity
For the year ended October 31, 2021												
Balance at beginning of period	$ 5,948	$ 17,628	$ (3)	$ (129)	$ 59,806	$ (139)	$ 4,632	$ (1,079)	$ 3,414	$ 86,664	$ 103	$ 86,767
Changes in equity												
Issues of share capital and other equity instruments	2,250	100	–	–	(5)	–	–	–	–	2,345	–	2,345
Common shares purchased for cancellation	–	–	–	–	–	–	–	–	–	–	–	–
Redemption of preferred shares and other equity instruments	(1,475)	–	–	–	–	–	–	–	–	(1,475)	–	(1,475)
Sales of treasury shares and other equity instruments	–	–	647	4,116	–	–	–	–	–	4,763	–	4,763
Purchases of treasury shares and other equity instruments	–	–	(683)	(4,060)	–	–	–	–	–	(4,743)	–	(4,743)
Share-based compensation awards	–	–	–	–	(6)	–	–	–	–	(6)	–	(6)
Dividends on common shares	–	–	–	–	(6,158)	–	–	–	–	(6,158)	–	(6,158)
Dividends on preferred shares and distributions on other equity instruments	–	–	–	–	(257)	–	–	–	–	(257)	(3)	(260)
Other	–	–	–	–	33	–	–	–	–	33	(10)	23
Net income	–	–	–	–	16,038	–	–	–	–	16,038	12	16,050
Total other comprehensive income (loss), net of taxes	–	–	–	–	2,344	51	(2,577)	1,645	(881)	1,463	(7)	1,456
Balance at end of period	$ 6,723	$ 17,728	$ (39)	$ (73)	$ 71,795	$ (88)	$ 2,055	$ 566	$ 2,533	$ 98,667	$ 95	$ 98,762

The accompanying notes are an integral part of these Consolidated Financial Statements.

Consolidated Statements of Cash Flows

(Millions of Canadian dollars)	For the year ended October 31 2022	October 31 2021
Cash flows from operating activities		
Net income	**$ 15,807**	$ 16,050
Adjustments for non-cash items and others		
Provision for credit losses	**484**	(753)
Depreciation	**1,265**	1,276
Deferred income taxes	**569**	581
Amortization and impairment of other intangibles	**1,387**	1,316
Net changes in investments in joint ventures and associates	**(108)**	(127)
Losses (Gains) on investment securities	**(43)**	(151)
Losses (Gains) on disposition of business	**(100)**	(26)
Adjustments for net changes in operating assets and liabilities		
Insurance claims and policy benefit liabilities	**(1,305)**	601
Net change in accrued interest receivable and payable	**333**	(509)
Current income taxes	**(3,336)**	1,738
Derivative assets	**(58,898)**	17,947
Derivative liabilities	**62,052**	(18,488)
Trading securities	**(8,931)**	(3,164)
Loans, net of securitizations	**(102,653)**	(54,987)
Assets purchased under reverse repurchase agreements and securities borrowed	**(9,942)**	5,112
Obligations related to assets sold under repurchase agreements and securities loaned	**11,746**	(12,030)
Obligations related to securities sold short	**(2,330)**	8,556
Deposits, net of securitizations	**108,533**	88,876
Brokers and dealers receivable and payable	**4,612**	35
Other	**2,800**	9,191
Net cash from (used in) operating activities	**21,942**	61,044
Cash flows from investing activities		
Change in interest-bearing deposits with banks	**(28,373)**	(40,618)
Proceeds from sales and maturities of investment securities	**99,143**	108,925
Purchases of investment securities	**(122,964)**	(123,547)
Net acquisitions of premises and equipment and other intangibles	**(2,500)**	(2,186)
Net proceeds from (cash transferred for) dispositions	**(313)**	78
Cash used in acquisitions, net of cash acquired	**(2,047)**	–
Net cash from (used in) investing activities	**(57,054)**	(57,348)
Cash flows from financing activities		
Issuance of subordinated debentures	**1,000**	2,750
Repayment of subordinated debentures	**(192)**	(2,500)
Issue of common shares, net of issuance costs	**51**	90
Common shares purchased for cancellation	**(5,426)**	–
Issue of preferred shares and other equity instruments, net of issuance costs	**749**	2,245
Redemption of preferred shares and other equity instruments	**(155)**	(1,475)
Sales of treasury shares	**5,474**	4,763
Purchases of treasury shares	**(5,701)**	(4,743)
Dividends paid on shares and distributions paid on other equity instruments	**(6,960)**	(6,420)
Dividends/distributions paid to non-controlling interests	**(5)**	(3)
Change in short-term borrowings of subsidiaries	**9,609**	(14)
Repayment of lease liabilities	**(629)**	(621)
Net cash from (used in) financing activities	**(2,185)**	(5,928)
Effect of exchange rate changes on cash and due from banks	**(4,152)**	(2,810)
Net change in cash and due from banks	**(41,449)**	(5,042)
Cash and due from banks at beginning of period (1)	**113,846**	118,888
Cash and due from banks at end of period (1)	**$ 72,397**	$ 113,846
Cash flows from operating activities include:		
Amount of interest paid	**$ 13,677**	$ 7,555
Amount of interest received	**35,817**	26,412
Amount of dividends received	**3,144**	2,575
Amount of income taxes paid	**7,326**	4,198

(1) We are required to maintain balances with central banks and other regulatory authorities. The total balances were $2 billion as at October 31, 2022 (October 31, 2021 – $2 billion; October 31, 2020 – $3 billion).

The accompanying notes are an integral part of these Consolidated Financial Statements.

Note 1 General information

Royal Bank of Canada and its subsidiaries (the Bank) provide diversified financial services including Personal & Commercial Banking, Wealth Management, Insurance, Investor & Treasury Services and Capital Markets products and services on a global basis. Refer to Note 27 for further details on our business segments.

The parent bank, Royal Bank of Canada, is a Schedule I Bank under the *Bank Act* (Canada) incorporated and domiciled in Canada. Our corporate headquarters are located at Royal Bank Plaza, 200 Bay Street, Toronto, Ontario, Canada and our head office is located at 1 Place Ville-Marie, Montreal, Quebec, Canada. Our common shares are listed on the Toronto Stock Exchange and New York Stock Exchange with the ticker symbol RY.

These Consolidated Financial Statements are prepared in compliance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB). Unless otherwise stated, monetary amounts are stated in Canadian dollars. Tabular information is stated in millions of dollars, except as noted. These Consolidated Financial Statements also comply with Subsection 308 of the *Bank Act* (Canada), which states that, except as otherwise specified by the Office of the Superintendent of Financial Institutions Canada (OSFI), our Consolidated Financial Statements are to be prepared in accordance with IFRS. The accounting policies outlined in Note 2 have been consistently applied to all periods presented.

On November 29, 2022, the Board of Directors authorized the Consolidated Financial Statements for issue.

Note 2 Summary of significant accounting policies, estimates and judgments

The significant accounting policies used in the preparation of these Consolidated Financial Statements, including the accounting requirements prescribed by OSFI, are summarized below. These accounting policies conform, in all material respects, to IFRS. The same accounting policies have been applied to all periods presented.

General

Use of estimates and assumptions

In preparing our Consolidated Financial Statements, management is required to make subjective estimates and assumptions that affect the reported amount of assets, liabilities, net income and related disclosures. Estimates made by management are based on historical experience and other assumptions that are believed to be reasonable. Key sources of estimation uncertainty include: determination of fair value of financial instruments, allowance for credit losses, insurance claims and policy benefit liabilities, pensions and other post-employment benefits, income taxes, goodwill and other intangible assets, and provisions. Accordingly, actual results may differ from these and other estimates thereby impacting our future Consolidated Financial Statements. Refer to the relevant accounting policies in this Note for details on our use of estimates and assumptions.

Significant judgments

In preparation of these Consolidated Financial Statements, management is required to make significant judgments that affect the carrying amounts of certain assets and liabilities, and the reported amounts of revenues and expenses recorded during the period. Significant judgments have been made in the following areas and discussed as noted in the Consolidated Financial Statements:

Consolidation of structured entities	Note 2 Note 8	Application of the effective interest method	Note 2
Fair value of financial instruments	Note 2 Note 3	Derecognition of financial assets	Note 2 Note 7
Allowance for credit losses	Note 2 Note 4 Note 5	Income taxes	Note 2 Note 22
Employee benefits	Note 2 Note 17	Provisions	Note 2 Note 24 Note 25
Goodwill and other intangibles	Note 2 Note 11		

Basis of consolidation

Our Consolidated Financial Statements include the assets and liabilities and results of operations of the parent company, Royal Bank of Canada, and its subsidiaries including certain structured entities, after elimination of intercompany transactions, balances, revenues and expenses.

Consolidation

Subsidiaries are those entities, including structured entities, over which we have control. We control an entity when we are exposed, or have rights, to variable returns from our involvement with the entity and have the ability to affect those returns through our power over the investee. We have power over an entity when we have existing rights that give us the current ability to direct the activities that most significantly affect the entity's returns (relevant activities). Power may be determined on the basis of voting rights or, in the case of structured entities, other contractual arrangements.

We are not deemed to control an entity when we exercise power over an entity in an agency capacity. In determining whether we are acting as an agent, we consider the overall relationship between us, the investee and other parties to the arrangement with respect to the following factors: (i) the scope of our decision-making power; (ii) the rights held by other parties; (iii) the remuneration to which we are entitled; and (iv) our exposure to variability of returns.

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

The determination of control is based on the current facts and circumstances and is continuously assessed. In some circumstances, different factors and conditions may indicate that different parties control an entity depending on whether those factors and conditions are assessed in isolation or in totality. Significant judgment is applied in assessing the relevant factors and conditions in totality when determining whether we control an entity. Specifically, judgment is applied in assessing whether we have substantive decision-making rights over the relevant activities and whether we are exercising our power as a principal or an agent.

We consolidate all subsidiaries from the date we obtain control and cease consolidation when an entity is no longer controlled by us. Our consolidation conclusions affect the classification and amount of assets, liabilities, revenues and expenses reported in our Consolidated Financial Statements.

Non-controlling interests in subsidiaries that we consolidate are shown on our Consolidated Balance Sheets as a separate component of equity which is distinct from equity attributable to our shareholders. The net income attributable to non-controlling interests is separately disclosed in our Consolidated Statements of Income.

Investments in joint ventures and associates

Our investments in associated corporations and limited partnerships over which we have significant influence are accounted for using the equity method. The equity method is also applied to our interests in joint ventures over which we have joint control. Under the equity method of accounting, investments are initially recorded at cost, and the carrying amount is increased or decreased to recognize our share of the investee's net profit or loss, including our proportionate share of the investee's Other comprehensive income (OCI), subsequent to the date of acquisition.

Non-current assets held for sale and discontinued operations

Non-current assets (and disposal groups) are classified as held for sale if their carrying amounts will be recovered principally through a sale transaction rather than through continuing use. This condition is satisfied when the asset is available for immediate sale in its present condition, management is committed to the sale, and it is highly probable to occur within one year. Non-current assets (and disposal groups) classified as held for sale are measured at the lower of their previous carrying amount and fair value less costs to sell and if significant, are presented separately from other assets on our Consolidated Balance Sheets.

A disposal group is classified as a discontinued operation if it meets the following conditions: (i) it is a component that can be distinguished operationally and financially from the rest of our operations and (ii) it represents either a separate major line of business or is part of a single coordinated plan to dispose of a separate major line of business or geographical area of operations. Disposal groups classified as discontinued operations are presented separately from our continuing operations in our Consolidated Statements of Income.

Financial Instruments

Classification of financial assets

Financial assets are measured at initial recognition at fair value, and are classified and subsequently measured at fair value through profit or loss (FVTPL), fair value through other comprehensive income (FVOCI) or amortized cost based on our business model for managing the financial instruments and the contractual cash flow characteristics of the instrument.

Debt instruments are measured at amortized cost if both of the following conditions are met and the asset is not designated as FVTPL: (a) the asset is held within a business model that is Held-to-Collect (HTC) as described below, and (b) the contractual terms of the instrument give rise to cash flows that are solely payments of principal and interest on the principal amount outstanding (SPPI).

Debt instruments are measured at FVOCI if both of the following conditions are met and the asset is not designated as FVTPL: (a) the asset is held within a business model that is Held-to-Collect-and-Sell (HTC&S) as described below, and (b) the contractual terms of the instrument give rise, on specified dates, to cash flows that are SPPI.

All other debt instruments are measured at FVTPL.

Equity instruments are measured at FVTPL, unless the asset is not held for trading purposes and we make an irrevocable election to designate the asset as FVOCI. This election is made on an instrument-by-instrument basis.

Business model assessment

We determine our business models at the level that best reflects how we manage portfolios of financial assets to achieve our business objectives. Judgment is used in determining our business models, which is supported by relevant, objective evidence including:

- How the economic activities of our businesses generate benefits, for example through trading revenue, enhancing yields or hedging funding or other costs and how such economic activities are evaluated and reported to key management personnel;
- The significant risks affecting the performance of our businesses, for example, market risk, credit risk, or other risks as described in the Risk Management section of Management's Discussion and Analysis, and the activities undertaken to manage those risks;
- Historical and future expectations of sales of the loans or securities portfolios managed as part of a business model; and
- The compensation structures for managers of our businesses, to the extent that these are directly linked to the economic performance of the business model.

Our business models fall into three categories, which are indicative of the key strategies used to generate returns:

- HTC: The objective of this business model is to hold loans and securities to collect contractual principal and interest cash flows. Sales are incidental to this objective and are expected to be insignificant or infrequent.
- HTC&S: Both collecting contractual cash flows and sales are integral to achieving the objective of the business model.
- Other fair value business models: These business models are neither HTC nor HTC&S, and primarily represent business models where assets are held-for-trading or managed on a fair value basis.

SPPI assessment
Instruments held within a HTC or HTC&S business model are assessed to evaluate if their contractual cash flows are comprised of solely payments of principal and interest. SPPI payments are those which would typically be expected from basic lending arrangements. Principal amounts include par repayments from lending and financing arrangements, and interest primarily relates to basic lending returns, including compensation for credit risk and the time value of money associated with the principal amount outstanding over a period of time. Interest can also include other basic lending risks and costs (for example, liquidity risk, servicing or administrative costs) associated with holding the financial asset for a period of time, and a profit margin.

Where the contractual terms introduce exposure to risk or variability of cash flows that are inconsistent with a basic lending arrangement, the related financial asset is classified and measured at FVTPL.

Securities
Trading securities include all securities that are classified as FVTPL by nature and securities designated as FVTPL. Obligations to deliver trading securities sold but not yet purchased are recorded as liabilities and carried at fair value. Realized and unrealized gains and losses on these securities are generally recorded as Non-interest income – Trading revenue or Non-interest income – Other. Dividends and interest income accruing on Trading securities are recorded in Interest and dividend income. Interest and dividends accrued on securities sold short are recorded in Interest expense.

Investment securities include all securities classified as FVOCI and amortized cost. All investment securities are initially recorded at fair value and subsequently measured according to the respective classification.

Investment securities carried at amortized cost are measured using the effective interest method, and are presented net of any allowance for credit losses, calculated in accordance with our policy for Allowance for credit losses, as described below. Interest income, including the amortization of premiums and discounts on securities measured at amortized cost are recorded in Interest and dividend income. Impairment gains or losses recognized on amortized cost securities are recorded in Provision for credit losses (PCL). When a debt instrument measured at amortized cost is sold, the difference between the sale proceeds and the amortized cost of the security at the time of the sale is recorded as Net gains on Investment securities in Non-interest income.

Debt securities carried at FVOCI are measured at fair value with unrealized gains and losses arising from changes in fair value included in Other components of equity. Impairment gains and losses are included in PCL and correspondingly reduce the accumulated changes in fair value included in Other components of equity. When a debt instrument measured at FVOCI is sold, the cumulative gain or loss is reclassified from Other components of equity to Net gains on Investment securities in Non-interest income.

Equity securities carried at FVOCI are measured at fair value. Unrealized gains and losses arising from changes in fair value are recorded in Other components of equity and not subsequently reclassified to profit or loss when realized. Dividends from FVOCI equity securities are recognized in Interest and dividend income.

We account for all of our securities using settlement date accounting and changes in fair value between the trade date and settlement date are reflected in income for securities measured at FVTPL, and changes in the fair value of securities measured at FVOCI between the trade and settlement dates are recorded in OCI except for changes in foreign exchange rates on debt securities, which are recorded in Non-interest income-Other.

Fair value option
A financial instrument with a reliably measurable fair value can be designated as FVTPL (the fair value option) on its initial recognition even if the financial instrument was not acquired or incurred principally for the purpose of selling or repurchasing. The fair value option can be used for financial assets if it eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise from measuring assets or liabilities, or recognizing related gains and losses on a different basis (an accounting mismatch). The fair value option can be elected for financial liabilities if: (i) the election eliminates an accounting mismatch; (ii) the financial liability is part of a portfolio that is managed on a fair value basis, in accordance with a documented risk management or investment strategy; or (iii) there is an embedded derivative in the financial or non-financial host contract and the derivative is not closely related to the host contract. These instruments cannot be reclassified out of the FVTPL category while they are held or issued.

Financial assets designated as FVTPL are recorded at fair value and any unrealized gain or loss arising due to changes in fair value is included in Trading revenue or Non-interest income – Other, depending on our business purpose for holding the financial asset.

Financial liabilities designated as FVTPL are recorded at fair value and fair value changes attributable to changes in our own credit risk are recorded in OCI. Own credit risk amounts recognized in OCI will not be reclassified subsequently to net income. The remaining fair value changes not attributable to changes in our own credit risk are recorded in Trading revenue or Non-interest income – Other, depending on our business purpose for holding the financial liability. Upon initial recognition, if we determine that presenting the effects of own credit risk changes in OCI would create or enlarge an accounting mismatch in net income, the full fair value change in our debt designated as FVTPL is recognized in net income. To make that determination, we assess whether we expect that the effects of changes in the liability's credit risk will be offset in profit or loss by a change in the fair value of another financial instrument measured at FVTPL. Such an expectation is based on an economic relationship between the characteristics of the liability and the characteristics of the other financial instrument. The determination is made at initial recognition and is not reassessed. To determine the fair value adjustments on our debt instruments designated as FVTPL, we calculate the present value of the instruments based on the contractual cash flows over the term of the arrangement by using our effective funding rate at the beginning and end of the period.

Determination of fair value
The fair value of a financial instrument is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. We determine fair value by incorporating all factors that market participants would consider in setting a price, including commonly accepted valuation approaches.

The Board of Directors provides oversight on valuation of financial instruments, primarily through the Audit Committee and Risk Committee. The Audit Committee reviews the presentation and disclosure of financial instruments that are measured at fair value, while the Risk Committee assesses the adequacy of governance structures and control processes for the valuation of these instruments.

We have established policies, procedures and controls for valuation methodologies and techniques to ensure that fair value is reasonably estimated. Major valuation processes and controls include, but are not limited to, profit and loss decomposition, independent price verification (IPV) and model validation standards. These control processes are managed by either Finance or Group Risk Management and are independent of the relevant businesses and their trading functions. Profit and loss

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

decomposition is a process to explain the fair value changes of certain positions and is performed daily for trading portfolios. All fair value instruments are subject to IPV, a process whereby trading function valuations are verified against external market prices and other relevant market data. Market data sources include traded prices, brokers and price vendors. We give priority to those third-party pricing services and prices having the highest and most consistent accuracy. The level of accuracy is determined over time by comparing third-party price values to traders' or system values, to other pricing service values and, when available, to actual trade data. Quoted prices for identical instruments from pricing services or brokers are generally not adjusted unless there are issues such as stale prices. If multiple quotes for identical instruments are received, fair value is based on an average of the prices received or the quote from the most reliable vendor, after the outlier prices that fall outside of the pricing range are removed. Other valuation techniques are used when a price or quote is not available. Some valuation processes use models to determine fair value. We have a systematic and consistent approach to control the use of models. Valuation models are approved for use within our model risk management framework. The framework addresses, among other things, model development standards, validation processes and procedures and approval authorities. Model validation ensures that a model is suitable for its intended use and sets parameters for its use. All models are revalidated regularly by qualified personnel who are independent of the model design and development. Annually our model risk profile is reported to the Board of Directors.

IFRS 13 *Fair Value Measurement* permits an exception, through an accounting policy choice, to measure the fair value of a portfolio of financial instruments on a net open risk position basis when certain criteria are met. We have elected to use this policy choice to determine the fair value of certain portfolios of financial instruments, primarily derivatives, based on a net exposure to market or credit risk.

We record valuation adjustments to appropriately reflect counterparty credit quality of our derivative portfolio, differences between the actual counterparty collateral discount curve and standard overnight index swap (OIS) discounting for collateralized derivatives, funding valuation adjustments (FVA) for uncollateralized and under-collateralized over-the-counter (OTC) derivatives, unrealized gains or losses at inception of the transaction, bid-offer spreads, unobservable parameters and model limitations. These adjustments may be subjective as they require significant judgment in the input selection, such as implied probability of default (PD) and recovery rate, and are intended to arrive at a fair value that is determined based on assumptions that market participants would use in pricing the financial instrument. The realized price for a transaction may be different from its recorded value, previously estimated using management judgment. Valuation adjustments may therefore impact unrealized gains and losses recognized in Non-interest income – Trading revenue or Other.

Valuation adjustments are recorded for the credit risk of our derivative portfolios in order to arrive at their fair values. Credit valuation adjustments (CVA) take into account our counterparties' creditworthiness, the current and potential future mark-to-market of transactions and the effects of credit mitigants such as master netting and collateral agreements. CVA amounts are derived from estimates of exposure at default (EAD), PD, recovery rates on a counterparty basis and market and credit factor correlations. EAD is the value of expected derivative related assets and liabilities at the time of default, estimated through modelling using underlying risk factors. PD is implied from the market prices for credit protection and the credit ratings of the counterparty. When market data is unavailable, it is estimated by incorporating assumptions and adjustments that market participants would use for determining fair value using these inputs. Correlation is the statistical measure of how credit and market factors may move in relation to one another. Correlation is estimated using historical data. CVA is calculated daily and changes are recorded in Non-interest income – Trading revenue.

FVA are also calculated to incorporate the cost and benefit of funding in the valuation of uncollateralized and under-collateralized OTC derivatives. Future expected cash flows of these derivatives are discounted to reflect the cost and benefit of funding the derivatives by using a funding curve, implied volatilities and correlations as inputs.

Where required, a valuation adjustment is made to reflect the unrealized gain or loss at inception of a financial instrument contract where the fair value of that financial instrument is not obtained from a quoted market price or cannot be evidenced by other observable market transactions based on a valuation technique incorporating observable market data.

A bid-offer valuation adjustment is required when a financial instrument is valued at the mid-market price, instead of the bid or offer price for asset or liability positions, respectively. The valuation adjustment takes into account the spread from the mid-market price to either the bid or offer price.

Some valuation models require parameter calibration from such factors as market observable option prices. The calibration of parameters may be sensitive to factors such as the choice of instruments or optimization methodology. A valuation adjustment is also estimated to mitigate the uncertainties of parameter calibration and model limitations.

In determining fair value, a hierarchy is used which prioritizes the inputs to valuation techniques. The fair value hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). Determination of fair value based on this hierarchy requires the use of observable market data whenever available. Level 1 inputs are unadjusted quoted prices in active markets for identical assets or liabilities that we have the ability to access at the measurement date. Level 2 inputs include quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and model inputs that are either observable, or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Level 3 inputs are one or more inputs that are unobservable and significant to the fair value of the asset or liability. Unobservable inputs are used to measure fair value to the extent that observable inputs are not available at the measurement date. The availability of inputs for valuation may affect the selection of valuation techniques. The classification of a financial instrument in the hierarchy for disclosure purposes is based upon the lowest level of input that is significant to the measurement of fair value.

Where observable prices or inputs are not available, management judgment is required to determine fair values by assessing other relevant sources of information such as historical data, proxy information from similar transactions, and through extrapolation and interpolation techniques. For more complex or illiquid instruments, significant judgment is required in the determination of the model used, the selection of model inputs, and in some cases the application of valuation adjustments to the model value or quoted price for inactively traded financial instruments, as the selection of model inputs may be subjective and the inputs may be unobservable. Unobservable inputs are inherently uncertain as there is little or no market data available from which to determine the level at which the transaction would occur under normal business circumstances. Appropriate parameter uncertainty and market risk valuation adjustments for such inputs and other model risk valuation adjustments are assessed in all such instances.

Loans

Loans are debt instruments recognized initially at fair value and are subsequently measured in accordance with the Classification of financial assets policy provided above. The majority of our loans are carried at amortized cost using the effective interest method, which represents the gross carrying amount less allowance for credit losses.

Interest on loans is recognized in Interest income using the effective interest method. The estimated future cash flows used in this calculation include those determined by the contractual term of the asset and all fees that are considered to be integral to the effective interest rate. Also included in this amount are transaction costs and all other premiums or discounts. Fees that relate to activities such as originating, restructuring or renegotiating loans are deferred and recognized as Interest income over the expected term of such loans using the effective interest method. Where there is a reasonable expectation that a loan will be originated, commitment and standby fees are also recognized as interest income over the expected term of the resulting loans using the effective interest method. Otherwise, such fees are recorded as other liabilities and amortized into Non-interest income over the commitment or standby period. Future prepayment fees on mortgage loans are not included as part of the effective interest rate at origination. If prepayment fees are received on a renewal of a mortgage loan before maturity, the fee is included as part of the effective interest rate, and if not renewed, the prepayment fee is recognized in interest income at the prepayment date.

For loans carried at amortized cost or FVOCI, impairment losses are recognized at each balance sheet date in accordance with the three-stage impairment model outlined below.

Allowance for credit losses

An allowance for credit losses (ACL) is established for all financial assets, except for financial assets classified or designated as FVTPL and equity securities designated as FVOCI, which are not subject to impairment assessment. Assets subject to impairment assessment include loans, debt securities, interest-bearing deposits with banks, customers' liability under acceptances, accounts and accrued interest receivable, and finance and operating lease receivables. ACL on loans measured at amortized cost is presented in Allowance for loan losses. ACL on debt securities measured at FVOCI is presented in Other components of equity. Other financial assets carried at amortized cost are presented net of ACL on our Consolidated Balance Sheets.

Off-balance sheet items subject to impairment assessment include financial guarantees and undrawn loan commitments. ACL on off-balance sheet items is separately calculated and included in Other Liabilities – Provisions.

We measure the ACL on each balance sheet date according to a three-stage expected credit loss impairment model:

- Performing financial assets
  - Stage 1 – From initial recognition of a financial asset to the date on which the asset has experienced a significant increase in credit risk relative to its initial recognition, a loss allowance is recognized equal to the credit losses expected to result from defaults occurring over the 12 months following the reporting date.
  - Stage 2 – Following a significant increase in credit risk relative to the initial recognition of the financial asset, a loss allowance is recognized equal to the credit losses expected over the remaining lifetime of the asset.
- Impaired financial assets
  - Stage 3 – When a financial asset is considered to be credit-impaired, a loss allowance is recognized equal to credit losses expected over the remaining lifetime of the asset. Interest income is calculated based on the carrying amount of the asset, net of the loss allowance, rather than on its gross carrying amount.

The ACL is a discounted probability-weighted estimate of the cash shortfalls expected to result from defaults over the relevant time horizon. For loan commitments, credit loss estimates consider the portion of the commitment that is expected to be drawn over the relevant time period. For financial guarantees, credit loss estimates are based on the expected payments required under the guarantee contract. For finance lease receivables, credit loss estimates are based on cash flows consistent with the cash flows used in measuring the lease receivable.

Increases or decreases in the required ACL attributable to model changes and new originations, sales or maturities, and changes in risk, parameters and exposures due to changes in loss expectations or stage transfers are recorded in PCL. Write-offs and recoveries of amounts previously written off are recorded against ACL.

The ACL represents an unbiased estimate of expected credit losses on our financial assets as at the balance sheet date. Judgment is required in making assumptions and estimations when calculating the ACL, including movements between the three stages and the application of forward-looking information. The underlying assumptions and estimates may result in changes to the provisions from period to period that significantly affect our results of operations.

Measurement of expected credit losses

Expected credit losses are based on a range of possible outcomes and consider all available reasonable and supportable information including internal and external ratings, historical credit loss experience, and expectations about future cash flows. The measurement of expected credit losses is based primarily on the product of the instrument's PD, loss given default (LGD), and EAD discounted to the reporting date. The main difference between Stage 1 and Stage 2 expected credit losses for performing financial assets is the respective calculation horizon. Stage 1 estimates project PD, LGD and EAD over a maximum period of 12 months while Stage 2 estimates project PD, LGD and EAD over the remaining lifetime of the instrument.

An expected credit loss estimate is produced for each individual exposure. Relevant parameters are modelled on a collective basis using portfolio segmentation that allows for appropriate incorporation of forward-looking information. To reflect other characteristics that are not already considered through modelling, expert credit judgment is exercised in determining the final expected credit losses.

For a small percentage of our portfolios which lack detailed historical information and/or loss experience, we apply simplified measurement approaches that may differ from what is described above. These approaches have been designed to maximize the available information that is reliable and supportable for each portfolio and may be collective in nature.

Expected credit losses are discounted to the reporting period date using the effective interest rate.

Expected life

For instruments in Stage 2 or Stage 3, loss allowances reflect expected credit losses over the expected remaining lifetime of the instrument. For most instruments, the expected life is limited to the remaining contractual life.

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

An exemption is provided for certain instruments with the following characteristics: (a) the instrument includes both a loan and undrawn commitment component; (b) we have the contractual ability to demand repayment and cancel the undrawn commitment; and (c) our exposure to credit losses is not limited to the contractual notice period. For products in scope of this exemption, the expected life may exceed the remaining contractual life and is the period over which our exposure to credit losses is not mitigated by our normal credit risk management actions. This period varies by product and risk category and is estimated based on our historical experience with similar exposures and consideration of credit risk management actions taken as part of our regular credit review cycle. Products in scope of this exemption include credit cards, overdraft balances and certain revolving lines of credit. Judgment is required in determining the instruments in scope for this exemption and estimating the appropriate remaining life based on our historical experience and credit risk mitigation practices.

Assessment of significant increase in credit risk

The assessment of significant increase in credit risk requires significant judgment. Movements between Stage 1 and Stage 2 are based on whether an instrument's credit risk as at the reporting date has increased significantly relative to the date it was initially recognized. For the purposes of this assessment, credit risk is based on an instrument's lifetime PD, not the losses we expect to incur. The assessment is generally performed at the instrument level.

Our assessment of significant increases in credit risk is performed at least quarterly based on three factors. If any of the following factors indicates that a significant increase in credit risk has occurred, the instrument is moved from Stage 1 to Stage 2:

(1) We have established thresholds for significant increases in credit risk based on both a percentage and absolute change in lifetime PD relative to initial recognition. For our wholesale portfolio, a decrease in the borrower's risk rating is also required to determine that credit risk has increased significantly.

(2) Additional qualitative reviews are performed to assess the staging results and make adjustments, as necessary, to better reflect the positions whose credit risk has increased significantly.

(3) Instruments which are 30 days past due are generally considered to have experienced a significant increase in credit risk, even if our other metrics do not indicate that a significant increase in credit risk has occurred.

The thresholds for movement between Stage 1 and Stage 2 are symmetrical. After a financial asset has transferred to Stage 2, if its credit risk is no longer considered to have significantly increased relative to its initial recognition, the financial asset will move back to Stage 1.

For certain instruments with low credit risk as at the reporting date, it is presumed that credit risk has not increased significantly relative to initial recognition. Credit risk is considered to be low if the instrument has a low risk of default, and the borrower has the ability to fulfill their contractual obligations both in the near term and in the longer term, including periods of adverse changes in the economic or business environment. Certain interest-bearing deposits with banks, assets purchased under reverse repurchase agreements, insurance policy loans, and liquidity facilities extended to our multi-seller conduits have been identified as having low credit risk.

Use of forward-looking information

The measurement of expected credit losses for each stage and the assessment of significant increase in credit risk considers information about past events and current conditions as well as reasonable and supportable projections of future events and economic conditions. The estimation and application of forward-looking information requires significant judgment.

The PD, LGD and EAD inputs used to estimate Stage 1 and Stage 2 credit loss allowances are modelled based on the macroeconomic variables (or changes in macroeconomic variables) that are most closely correlated with credit losses in the relevant portfolio. Each macroeconomic scenario used in our expected credit loss calculation includes a projection of all relevant macroeconomic variables used in our models for a five year period, subsequently reverting to long-run averages. Macroeconomic variables used in our expected credit loss models include, but are not limited to, unemployment rates, gross domestic product growth rates, equity return indices, commodity prices, and Canadian housing prices. Depending on their usage in the models, macroeconomic variables may be projected at a country, province/state or more granular level.

Our estimation of expected credit losses in Stage 1 and Stage 2 is a discounted probability-weighted estimate that considers a minimum of three future macroeconomic scenarios. Our base case scenario is based on macroeconomic forecasts published by our internal economics group. Upside and downside scenarios vary relative to our base case scenario based on reasonably possible alternative macroeconomic conditions. Additional and more severe downside scenarios are designed to capture a broader range of potential credit losses in certain sectors. Scenario design, including the identification of additional downside scenarios, occurs at least on an annual basis and more frequently if conditions warrant.

Scenarios are designed to capture a wide range of possible outcomes and weighted according to our best estimate of the relative likelihood of the range of outcomes that each scenario represents. Scenario weights take into account historical frequency, current trends, and forward-looking conditions and are updated on a quarterly basis. All scenarios considered are applied to all portfolios subject to expected credit losses with the same probabilities.

Our assessment of significant increases in credit risk is based on changes in probability-weighted forward-looking lifetime PDs as at the reporting date, using the same macroeconomic scenarios as the calculation of expected credit losses.

Definition of default

The definition of default used in the measurement of expected credit losses is consistent with the definition of default used for our internal credit risk management purposes. Our definition of default may differ across products and consider both quantitative and qualitative factors, such as the terms of financial covenants and days past due. For retail and wholesale borrowers, except as detailed below, default occurs when the borrower is more than 90 days past due on any material obligation to us, and/or we consider the borrower unlikely to make their payments in full without recourse action on our part, such as taking formal possession of any collateral held. For certain credit card balances, default occurs when payments are 180 days past due. For these balances, the use of a period in excess of 90 days past due is reasonable and supported by observable data on write-off and recovery rates experienced on historical credit card portfolios. The definition of default used is applied consistently from period to period and to all financial instruments unless it can be demonstrated that circumstances have changed such that another definition of default is more appropriate.

Credit-impaired financial assets (Stage 3)

Financial assets are assessed for credit-impairment at each balance sheet date and more frequently when circumstances warrant further assessment. Evidence of credit-impairment may include indications that the borrower is experiencing significant financial difficulty, probability of bankruptcy or other financial reorganization, as well as a measurable decrease in the estimated future cash flows evidenced by the adverse changes in the payments status of the borrower or economic conditions that correlate with defaults. An asset that is in Stage 3 will move back to Stage 2 when, as at the reporting date, it is no longer considered to be credit-impaired. The asset will transfer back to Stage 1 when its credit risk at the reporting date is no longer considered to have increased significantly from initial recognition, which could occur during the same reporting period as the transfer from Stage 3 to Stage 2.

When a financial asset has been identified as credit-impaired, expected credit losses are measured as the difference between the asset's gross carrying amount and the present value of estimated future cash flows discounted at the instrument's original effective interest rate. For impaired financial assets with drawn and undrawn components, expected credit losses also reflect any credit losses related to the portion of the loan commitment that is expected to be drawn down over the remaining life of the instrument.

When a financial asset is credit-impaired, interest ceases to be recognized on the regular accrual basis, which accrues income based on the gross carrying amount of the asset. Rather, interest income is calculated by applying the original effective interest rate to the amortized cost of the asset, which is the gross carrying amount less the related ACL.

ACL for credit-impaired loans in Stage 3 are established at the borrower level, where losses related to impaired loans are identified on individually significant loans, or collectively assessed and determined through the use of portfolio-based rates, without reference to particular loans.

Individually assessed loans (Stage 3)

When individually significant loans are identified as impaired, we reduce the carrying value of the loans to their estimated realizable value by recording an individually assessed ACL to cover identified credit losses. The individually assessed ACL reflects the expected amount of principal and interest calculated under the terms of the original loan agreement that will not be recovered, and the impact of time delays in collecting principal and/or interest (time value of money). The estimated realizable value for each individually significant loan is the present value of expected future cash flows discounted using the original effective interest rate for each loan. When the amounts and timing of future cash flows cannot be estimated with reasonable reliability, the estimated realizable amount may be determined using observable market prices for comparable loans, the fair value of collateral underlying the loans, and other reasonable and supported methods based on management judgment.

Individually-assessed allowances are established in consideration of a range of possible outcomes, which may include macroeconomic or non-macroeconomic scenarios, to the extent relevant to the circumstances of the specific borrower being assessed. Assumptions used in estimating expected future cash flows reflect current and expected future economic conditions and are generally consistent with those used in Stage 1 and Stage 2 measurement.

Significant judgment is required in assessing evidence of credit-impairment and estimation of the amount and timing of future cash flows when determining expected credit losses. Changes in the amount expected to be recovered would have a direct impact on PCL and may result in a change in the ACL.

Collectively assessed loans (Stage 3)

Loans that are collectively assessed are grouped on the basis of similar risk characteristics, taking into account loan type, industry, geographic location, collateral type, past due status and other relevant factors.

The collectively-assessed ACL reflects: (i) the expected amount of principal and interest calculated under the terms of the original loan agreement that will not be recovered, and (ii) the impact of time delays in collecting principal and/or interest (time value of money).

The expected principal and interest collection is estimated on a portfolio basis and references historical loss experience of comparable portfolios with similar credit risk characteristics, adjusted for the current environment and expected future conditions. A portfolio specific coverage ratio is applied against the impaired loan balance in determining the collectively-assessed ACL. The time value of money component is calculated by using the discount factors applied to groups of loans sharing common characteristics. The discount factors represent the expected recovery pattern of the comparable group of loans, and reflect the historical experience of these groups adjusted for current and expected future economic conditions and/or industry factors. Significant judgment is required in assessing evidence of impairment and estimation of the amount and timing of future cash flows when determining expected credit losses. Changes in the amount expected to be recovered would have a direct impact on PCL and may result in a change in the ACL.

Write-off of loans

Loans and the related ACL are written off, either partially or in full, when there is no realistic prospect of recovery. Where loans are secured, they are generally written off after receipt of any proceeds from the realization of collateral. In circumstances where the net realizable value of any collateral has been determined and there is no reasonable expectation of further recovery, write off may be earlier. For credit cards, the balances and related ACL are generally written off when payment is 180 days past due. Personal loans are generally written off at 150 days past due.

Modifications

The original terms of a financial asset may be renegotiated or otherwise modified, resulting in changes to the contractual terms of the financial asset that affect the contractual cash flows. The treatment of such modifications is primarily based on the process undertaken to execute the renegotiation and the nature and extent of the expected changes. In the normal course of business, modifications which are performed for credit reasons, primarily related to troubled debt restructurings, are generally treated as modifications of the original financial asset. Modifications which are performed for other than credit reasons are generally considered to be an expiry of the original cash flows; accordingly, such renegotiations are treated as a derecognition of the original financial asset and recognition of a new financial asset.

If a modification of terms does not result in derecognition of the financial asset, the carrying amount of the financial asset is recalculated as the present value of the renegotiated or modified contractual cash flows, discounted at the original effective interest rate and a gain or loss is recognized. The financial asset continues to be subject to the same assessments for significant

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

increase in credit risk relative to initial recognition and credit-impairment, as described above. A modified financial asset will transfer out of Stage 3 if the conditions that led to it being identified as credit-impaired are no longer present and relate objectively to an event occurring after the original credit-impairment was recognized. A modified financial asset will transfer out of Stage 2 when it no longer satisfies the relative thresholds set to identify significant increases in credit risk, which are based on changes in its lifetime PD, days past due and other qualitative considerations. The financial asset continues to be monitored for significant increases in credit risk and credit-impairment.

If a modification of terms results in derecognition of the original financial asset and recognition of the new financial asset, the new financial asset will generally be recorded in Stage 1, unless it is determined to be credit-impaired at the time of the renegotiation. For the purposes of assessing for significant increases in credit risk, the date of initial recognition for the new financial asset is the date of the modification.

Derivatives

When derivatives are embedded in other financial instruments or host contracts, such combinations are known as hybrid instruments. Some of the cash flows of a hybrid instrument vary in a way similar to a stand-alone derivative. If the host contract is a financial asset within the scope of IFRS 9 *Financial Instruments* (IFRS 9), the classification and measurement criteria are applied to the entire hybrid instrument as described in the Classification of financial assets section of Note 2. If the host contract is a financial liability or an asset that is not within the scope of IFRS 9, embedded derivatives are separately recognized if the economic characteristics and risks of the embedded derivative are not clearly and closely related to the host contract, unless an election has been made to elect the fair value option, as described above. The host contract is accounted for in accordance with the relevant standards.

Derivatives are primarily used in trading activities. Derivatives are also used to manage our exposure to interest, currency, credit and other market risks. The most frequently used derivative products are interest rate and foreign exchange swaps, options, futures and forward rate agreements, equity swaps and credit derivatives. All derivative instruments are recorded on our Consolidated Balance Sheets at fair value.

When derivatives are used in trading activities, the realized and unrealized gains and losses on these derivatives are recognized in Trading revenue in Non-interest income. Derivatives with positive fair values are reported as Derivative assets and derivatives with negative fair values are reported as Derivative liabilities. In accordance with our policy for offsetting financial assets and financial liabilities, the net fair value of certain derivative assets and liabilities are reported as an asset or liability, as appropriate. Valuation adjustments are included in the fair value of Derivative assets and Derivative liabilities. Premiums paid and premiums received are shown in Derivative assets and Derivative liabilities, respectively.

When derivatives are used to manage our own exposures, we determine for each derivative whether hedge accounting can be applied, as discussed in the Hedge accounting section below.

Derecognition of financial assets

Financial assets are derecognized from our Consolidated Balance Sheets when our contractual rights to the cash flows from the assets have expired, when we retain the rights to receive the cash flows of the assets but assume an obligation to pay those cash flows to a third party subject to certain pass-through requirements or when we transfer our contractual rights to receive the cash flows and substantially all of the risk and rewards of the assets have been transferred. When we retain substantially all of the risks and rewards of the transferred assets, the transferred assets are not derecognized from our Consolidated Balance Sheets and are accounted for as secured financing transactions. When we neither retain nor transfer substantially all risks and rewards of ownership of the assets, we derecognize the assets if control over the assets is relinquished. If we retain control over the transferred assets, we continue to recognize the transferred assets to the extent of our continuing involvement.

Management judgment is applied in determining whether the contractual rights to the cash flows from the transferred assets have expired or whether we retain the rights to receive cash flows on the assets but assume an obligation to pay for those cash flows. We derecognize transferred financial assets if we transfer substantially all the risks and rewards of the ownership in the assets. When assessing whether we have transferred substantially all of the risk and rewards of the transferred assets, management considers the Bank's exposure before and after the transfer with the variability in the amount and timing of the net cash flows of the transferred assets. In transfers in which we retain the servicing rights, management has applied judgment in assessing the benefits of servicing against market expectations. When the benefits of servicing are greater than fair value, a servicing asset is recognized in Other assets in our Consolidated Balance Sheets. When the benefits of servicing are less than fair value, a servicing liability is recognized in Other liabilities in our Consolidated Balance Sheets.

Derecognition of financial liabilities

We derecognize a financial liability from our Consolidated Balance Sheets when our obligation specified in the contract expires, or is discharged or cancelled. We recognize the difference between the carrying amount of a financial liability transferred and the consideration paid in our Consolidated Statements of Income.

Interest

Interest is recognized in Interest income and Interest expense in the Consolidated Statements of Income for all interest-bearing financial instruments. The effective interest rate is the rate that discounts estimated future cash flows over the expected life of the financial asset or liability to the net carrying amount upon initial recognition. Significant judgment is applied in determining the effective interest rate due to uncertainty in the timing and amounts of future cash flows.

Dividend income

Dividend income is recognized when the right to receive payment is established. This is the ex-dividend date for listed equity securities, and usually the date when shareholders have approved the dividend for unlisted equity securities.

Transaction costs

Transaction costs are expensed as incurred for financial instruments classified or designated as FVTPL. For other financial instruments, transaction costs are capitalized on initial recognition. For financial assets and financial liabilities measured at

amortized cost, capitalized transaction costs are amortized through net income over the estimated life of the instrument using the effective interest method. For financial assets measured at FVOCI that do not have fixed or determinable payments and no fixed maturity, capitalized transaction costs are recognized in net income when the asset is derecognized or becomes impaired.

Offsetting financial assets and financial liabilities
Financial assets and financial liabilities are offset on the Consolidated Balance Sheets when there exists both a legally enforceable right to offset the recognized amounts and an intention to settle on a net basis, or realize the asset and settle the liability simultaneously.

Assets purchased under reverse repurchase agreements and sold under repurchase agreements
We purchase securities under agreements to resell (reverse repurchase agreements) and take possession of these securities. We monitor the market value of the securities purchased and additional collateral is obtained when appropriate. We have the right to liquidate the collateral held in the event of counterparty default. Reverse repurchase agreements are treated as collateralized lending transactions. We also sell securities under agreements to repurchase (repurchase agreements), which are treated as collateralized borrowing transactions. The securities received under reverse repurchase agreements and securities delivered under repurchase agreements are not recognized on, or derecognized from, our Consolidated Balance Sheets, respectively, unless the risks and rewards of ownership are obtained or relinquished.

Reverse repurchase agreements and repurchase agreements are carried on our Consolidated Balance Sheets at the amounts at which the securities were initially acquired or sold, except when they are classified or designated as FVTPL and are recorded at fair value. Interest earned on reverse repurchase agreements is included in Interest income, and interest incurred on repurchase agreements is included in Interest expense in our Consolidated Statements of Income. Changes in fair value for reverse repurchase agreements and repurchase agreements classified or designated as FVTPL are included in Trading revenue or Other in Non-interest income.

Hedge accounting
We have elected to continue to apply the hedge accounting principles under IAS 39 instead of those under IFRS 9.

We use derivatives and non-derivatives in our hedging strategies to manage our exposure to interest rate, currency, credit and other market risks. Where hedge accounting can be applied, a hedge relationship is designated and documented at inception to detail the particular risk management objective and strategy for undertaking the hedge transaction. The documentation identifies the specific asset, liability or anticipated cash flows being hedged, the risk that is being hedged, the type of hedging instrument used and how effectiveness will be assessed. We assess, both at the inception of the hedge and on an ongoing basis, whether the hedging instruments are 'highly effective' in offsetting changes in the fair value or cash flows of the hedged items. A hedge is regarded as highly effective only if the following criteria are met: (i) at inception of the hedge and throughout its life, the hedge is expected to be highly effective in achieving offsetting changes in fair value or cash flows attributable to the hedged risk, and (ii) actual results of the hedge are within a pre-determined range. We perform effectiveness testing to demonstrate that the relationship has been and is expected to be effective over the remaining term of the hedge. In the case of hedging a forecast transaction, the transaction must have a high probability of occurring and must present an exposure to variations in cash flows that could ultimately affect the reported net profit or loss. Hedge accounting is discontinued when it is determined that the hedging instrument is no longer effective as a hedge, the hedging instrument or hedged item is terminated or sold, or the forecast transaction is no longer deemed highly probable. Refer to Note 9 for the fair value of derivatives and non-derivative instruments categorized by their hedging relationships, as well as derivatives that are not designated in hedging relationships.

Until the hedging relationships impacted by the Interest rate benchmark reform (the Reform) fully transition to alternative benchmark rates (ABRs), our prospective effectiveness testing is based on existing hedged cash flows or hedged risks and any ineffectiveness arising from retrospective testing does not result in a discontinuation of the hedge. Additionally, effectiveness testing is applied separately to hedged items referencing ABRs and hedged items referencing interbank offered rates (IBORs), which include USD London Interbank Offered Rate (USD LIBOR) and Canadian Dollar Offered Rate (CDOR), in accordance with the Phase 2 amendments to IFRS 9 *Financial Instruments*, IAS 39 *Financial Instruments: Recognition and Measurement*, IFRS 7 *Financial Instruments: Disclosures*, IFRS 4 *Insurance contracts*, and IFRS 16 *Leases* (the Amendments). Subsequently, when these relationships fully transition to ABRs, and provided qualifying criteria are met, we will amend the related hedge documentation for the ABR risk, including consequential changes to the description of the hedging instrument(s), the hedged item(s), and the method for assessing hedge effectiveness, without discontinuing the existing hedging relationships.

Fair value hedges
In a fair value hedging relationship, the carrying value of the hedged item is adjusted for changes in fair value attributable to the hedged risk and recognized in Non-interest income. Changes in fair value of the hedged item, to the extent that the hedging relationship is effective, are offset by changes in the fair value of the hedging derivative, which are also recognized in Non-interest income. When hedge accounting is discontinued, the carrying value of the hedged item is no longer adjusted and the cumulative fair value adjustments to the carrying value of the hedged items are amortized to Net income over the expected remaining life of the hedged items.

We predominantly use interest rate swaps to hedge our exposure to changes in a fixed interest rate instrument's fair value caused by changes in interest rates. Until the hedging relationships impacted by the Reform fully transition to ABRs, we apply hedge accounting to IBOR rates which may not be contractually specified when that rate is separately identifiable and reliably measurable at inception of the hedge relationship.

Cash flow hedges
In a cash flow hedging relationship, the effective portion of the change in the fair value of the hedging derivative, net of taxes, is recognized in OCI and reclassified to profit or loss as the associated hedged forecast transaction occurs, while the ineffective portion is recognized in Non-interest income. When hedge accounting is discontinued, the cumulative amounts previously recognized in OCI are reclassified to Net interest income during the periods when the variability in the cash flows of the hedged item affects Net interest income. Unrealized gains and losses on derivatives are reclassified immediately to Net income when the hedged item is sold or terminated early, or when the forecast transaction is no longer expected to occur.

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

We predominantly use interest rate swaps to hedge the variability in cash flows related to a variable-rate asset or liability. Until the hedging relationships impacted by the Reform fully transition to ABRs, we treat the highly probable hedged IBORs based cash flows of groups of similar assets or liabilities with similar risk characteristics as unchanged as a result of the Reform. In addition, associated cash flow hedge reserves are not recycled into net income solely due to changes related to the transition from IBORs to ABRs. Subsequently, when some items in the group transition to ABRs before other items, the individual hedged items are allocated to subgroups based on the benchmark interest rate being hedged. We test hedge effectiveness based on the defined subgroups, in accordance with the Amendments, if eligibility requirements are met. If a subgroup fails the eligibility requirements, we would discontinue hedge accounting prospectively for the hedging relationship in its entirety.

Net investment hedges

In hedging our foreign currency exposure to a net investment in a foreign operation, the effective portion of foreign exchange gains and losses on the hedging instruments, net of applicable taxes, is recognized in OCI and the ineffective portion is recognized in Non-interest income. The amounts, or a portion thereof, previously recognized in Other components of equity are recognized in Net income on the disposal, or partial disposal, of the foreign operation.

We use foreign exchange contracts and foreign currency-denominated liabilities to manage our foreign currency exposures to net investments in foreign operations having a functional currency other than the Canadian dollar.

Guarantees

Financial guarantee contracts are contracts that contingently require us to make specified payments (in cash, other assets, our own shares or provision of services) to reimburse the holder for a loss it incurs because a specified debtor fails to make payment when due in accordance with the original or modified terms of a debt instrument. Liabilities are recognized on our Consolidated Balance Sheets at the inception of a guarantee for the fair value of the obligation undertaken in issuing the guarantee. Financial guarantees are subsequently remeasured at the higher of (i) the amount of expected credit losses and (ii) the amount initially recognized less, when appropriate, the cumulative amount of income recognized.

If the financial guarantee contract meets the definition of a derivative, it is measured at fair value at each balance sheet date and reported under Derivatives on our Consolidated Balance Sheets.

Insurance and segregated funds

Premiums from long-duration contracts, primarily life, health and annuity insurance (life insurance), are recognized when due in Non-interest income – Insurance premiums, investment and fee income. Premiums from short-duration contracts, primarily property and casualty, and fees for administrative services are recognized in Insurance premiums, investment and fee income over the related contract period. Unearned premiums of the short-duration contracts, representing the unexpired portion of premiums, are reported in Other liabilities. Investments made by our insurance operations are classified as FVOCI instruments and amortized cost instruments, except for investments supporting the policy benefit liabilities on life insurance contracts and a portion of property and casualty contracts. These are designated as FVTPL with changes in fair value reported in Insurance premiums, investment and fee income.

Insurance claims and policy benefit liabilities represent current claims and estimates for future insurance policy benefits. Liabilities for life insurance contracts are determined using the Canadian Asset Liability Method (CALM), which incorporates assumptions for mortality, morbidity, policy lapses and surrenders, investment yields, policy dividends, operating and policy maintenance expenses and provisions for adverse deviation. These assumptions are reviewed at least annually and updated in response to actual experience and market conditions. Liabilities for property and casualty insurance represent estimated provisions for reported and unreported claims. Liabilities for life and property and casualty insurance are included in Insurance claims and policy benefit liabilities. Changes in Insurance claims and policy benefit liabilities are included in the Insurance policyholder benefits, claims and acquisition expense in our Consolidated Statements of Income in the period in which the estimates change.

Premiums ceded for reinsurance and reinsurance recoveries on policyholder benefits and claims incurred are reported in income and expense as appropriate. Reinsurance recoverables, which relate to paid benefits and unpaid claims, are included in Other assets.

Acquisition costs for new insurance contracts consist of commissions, premium taxes, certain underwriting costs and other costs that vary with the acquisition of new contracts. Deferred acquisition costs for life insurance products are implicitly recognized in Insurance claims and policy benefit liabilities by CALM. For property and casualty insurance, these costs are classified as Other assets and amortized over the policy term.

Segregated funds are lines of business in which we issue an insurance contract where the benefit amount is directly linked to the market value of the investments held in the underlying fund. The contractual arrangement is such that the underlying segregated fund assets are registered in our name but the segregated fund policyholders bear the risks and rewards of the funds' investment performance. Liabilities for these contracts are calculated based on contractual obligations using actuarial assumptions and are at least equivalent to the surrender or transfer value calculated by reference to the value of the relevant underlying funds or indices. Segregated funds' assets and liabilities are separately presented on our Consolidated Balance Sheets. As the segregated fund policyholders bear the risks and rewards of the funds' performance, investment income earned by the segregated funds and expenses incurred by the segregated funds are offset and are not separately presented in our Consolidated Statements of Income. Fee income we earn from segregated funds includes management fees, mortality, policy administration and surrender charges, and these fees are recorded in Non-interest income – Insurance premiums, investment and fee income. We provide minimum death benefit and maturity value guarantees on segregated funds. The liability associated with these minimum guarantees is recorded in Insurance claims and policy benefit liabilities.

Liability adequacy tests are performed for all insurance contract portfolios at each balance sheet date to ensure the adequacy of insurance contract liabilities. Current best estimates of future contractual cash flows, claims handling and administration costs, and investment returns from the assets backing the liabilities are taken into account in the tests. When the test results indicate that there is a deficiency in liabilities, the deficiency is charged immediately to our Consolidated Statements of Income by writing down the deferred acquisition costs in Other assets and/or increasing Insurance claims and policy benefit liabilities.

Employee benefits – Pensions and other post-employment benefits

Our defined benefit pension expense, which is included in Non-interest expense – Human resources, consists of the cost of employee pension benefits for the current year's service, net interest on the net defined benefit liability (asset), past service cost and gains or losses on settlement. Remeasurements of the net defined benefit obligation, which comprise actuarial gains and losses and return on plan assets (excluding amounts included in net interest on the net defined benefit liability), are recognized immediately in OCI in the period in which they occur. Actuarial gains and losses comprise experience adjustments (the effects of differences between the previous actuarial assumptions and what has actually occurred), as well as the effects of changes in actuarial assumptions. Amounts recognized in OCI will not be reclassified subsequently to net income. Past service cost is the change in the present value of the defined benefit obligation resulting from a plan amendment or curtailment and is charged immediately to income.

For each defined benefit pension plan, we recognize the present value of our defined benefit obligations less the fair value of the plan assets as a defined benefit liability reported in Other liabilities – Employee benefit liabilities on our Consolidated Balance Sheets. For plans where there is a net defined benefit asset, the amount is reported as an asset in Other assets – Employee benefit assets on our Consolidated Balance sheets.

The calculation of defined benefit expenses and obligations requires significant judgment as the recognition is dependent on discount rates and various actuarial assumptions such as healthcare cost trend rates, projected salary increases, retirement age and mortality and termination rates. Due to the long-term nature of these plans, such estimates and assumptions are subject to inherent risks and uncertainties. For our pension and other post-employment benefit plans, the discount rate is determined by reference to market yields on high quality corporate bonds. Since the discount rate is based on currently available yields, and involves management's assessment of market liquidity, it is only a proxy for future yields. Actuarial assumptions, set in accordance with current practices in the respective countries of our plans, may differ from actual experience as country specific statistics are only estimates of future employee behaviour. These assumptions are determined by management and are reviewed by actuaries at least annually. Changes to any of the above assumptions may affect the amounts of benefits obligations, expenses and remeasurements that we recognize.

Our contributions to defined contribution pension plans are expensed when employees have rendered services in exchange for such contributions. Defined contribution pension expense is included in Non-interest expense – Human resources.

Share-based compensation

We offer share-based compensation plans to certain key employees and to ournon-employee directors.

To account for stock options granted to employees, compensation expense is recognized over the applicable vesting period with a corresponding increase in equity. Fair value is determined by using option valuation models, which take into account the exercise price of the option, the current share price, the risk free interest rate, the expected volatility of the share price over the life of the option and other relevant factors. When the options are exercised, the exercise price proceeds together with the amount initially recorded in equity are credited to common shares. Our other share-based compensation plans include performance deferred share plans and deferred share unit plans for key employees (the Plans). The obligations for the Plans are accrued over their vesting periods. The Plans are settled in cash.

For cash-settled awards, our accrued obligations are adjusted to their fair value at each balance sheet date. For share-settled awards, our expected obligations recognized in equity are based on the fair value of our common shares at the date of grant. Changes in our obligations, net of related hedges, are recorded as Non-interest expense – Human resources in our Consolidated Statements of Income with a corresponding increase in Other liabilities for cash-settled awards and in Retained earnings for share-settled awards. Compensation expense is recognized in the year the awards are earned by plan participants based on the vesting schedule of the relevant plans, net of estimated forfeitures.

The compensation cost attributable to options and awards granted to employees who are eligible to retire or will become eligible to retire during the vesting period, is recognized immediately if the employee is eligible to retire on the grant date or over the period between the grant date and the date the employee becomes eligible to retire.

Our contributions to the employee savings and share ownership plans are expensed as incurred.

Income taxes

Income tax comprises current tax and deferred tax and is recognized in our Consolidated Statements of Income except to the extent that it relates to items recognized directly in equity, in which case it is recognized in equity.

Current income tax payable on profits is recognized as an expense based on the applicable tax laws in each jurisdiction in the period in which profits arise, calculated using tax rates enacted or substantively enacted by the balance sheet date. Deferred tax is recognized on temporary differences between the carrying amounts of assets and liabilities for accounting and tax purposes. A deferred income tax asset or liability is determined for each temporary difference, except for earnings related to our subsidiaries, branches, associates and interests in joint ventures where the temporary differences will not reverse in the foreseeable future and we have the ability to control the timing of reversal. Deferred tax assets and liabilities are determined based on the tax rates that are expected to be in effect in the period that the asset is realized or the liability is settled, based on tax rates and tax laws that have been enacted or substantively enacted at the balance sheet date. Current tax assets and liabilities are offset when they are levied by the same taxation authority on either the same taxable entity or different taxable entities within the same tax reporting group (which intends to settle on a net basis), and when there is a legal right to offset. Deferred tax assets and liabilities are offset when the same conditions are satisfied. Our Consolidated Statements of Income include items that are non-taxable or non-deductible for income tax purposes and, accordingly, this causes the income tax provision to be different from what it would be if based on statutory rates.

Deferred income taxes accumulated as a result of temporary differences and tax loss carryforwards are included in Other assets and Other liabilities. On a quarterly basis, we review our deferred income tax assets to determine whether it is probable that the benefits associated with these assets will be realized; this review involves evaluating both positive and negative evidence.

We are subject to income tax laws in various jurisdictions where we operate, and the complex tax laws are potentially subject to different interpretations by us and the relevant taxation authorities. Significant judgment is required in the interpretation of the relevant tax laws and in assessing the probability of acceptance of our tax positions to determine our tax provision, which includes our best estimate of uncertain tax positions that are under audit or appeal by the relevant tax authorities. We perform a review on a quarterly basis to incorporate our best assessment based on information available, but

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

additional liability and income tax expense could result based on the acceptance of our tax positions by the relevant tax authorities.

The determination of our deferred tax asset or liability also requires significant management judgment as the recognition is dependent on our projection of future taxable profits and tax rates that are expected to be in effect in the period the asset is realized or the liability is settled. Any changes in our projection will result in changes in deferred tax assets or liabilities on our Consolidated Balance Sheets, and also deferred tax expense on our Consolidated Statements of Income.

Business combinations, goodwill and other intangibles

All business combinations are accounted for using the acquisition method. Non-controlling interests, if any, are recognized at their proportionate share of the fair value of identifiable assets and liabilities, unless otherwise indicated. Identifiable intangible assets are recognized separately from goodwill and included in Other intangibles. Goodwill represents the excess of the price paid for the business acquired over the fair value of the net identifiable assets acquired on the date of acquisition.

Goodwill

Goodwill is allocated to cash-generating units or groups of cash-generating units for the purpose of impairment testing, which is undertaken at the lowest level at which goodwill is monitored for internal management purposes. Impairment testing is performed annually as at August 1, or more frequently if there are objective indicators of impairment, by comparing the recoverable amount of a cash-generating unit (CGU) with its carrying amount. The recoverable amount of a CGU is the higher of its value in use (VIU) and its fair value less costs of disposal (FVLCD). VIU is the present value of the expected future cash flows from a CGU. FVLCD is the amount obtainable from the sale of a CGU in an orderly transaction between market participants, less disposal costs. The fair value of a CGU is estimated using valuation techniques such as a discounted cash flow method, adjusted to reflect the considerations of a prospective third-party buyer. External evidence such as binding sale agreements or recent transactions for similar businesses within the same industry is considered to the extent that it is available.

Significant judgment is involved in estimating the model inputs used to determine the recoverable amount of our CGUs, in particular future cash flows, discount rates and terminal growth rates, due to the uncertainty in the timing and amount of cash flows and the forward-looking nature of these inputs. Future cash flows are based on financial plans agreed by management which are estimated based on forecast results, business initiatives, planned capital investments and returns to shareholders. Discount rates are based on the bank-wide cost of capital, adjusted for CGU-specific risks and currency exposure as reflected by differences in expected inflation. Bank-wide cost of capital is based on the Capital Asset Pricing Model, the Dividend Growth Model and peer analysis. CGU-specific risks include country risk, business/operational risk, geographic risk (including political risk, devaluation risk, and government regulation), currency risk, and price risk (including product pricing risk and inflation). Terminal growth rates are based on the long-term steady state growth expectations in the countries within which the CGU operates. If the future cash flows and other assumptions in future periods deviate significantly from the current amounts used in our impairment testing, the value of our goodwill could become impaired, with any such impairment loss recognized in Non-interest expense.

The carrying amount of a CGU includes the carrying amount of assets, liabilities and goodwill allocated to the CGU. If the recoverable amount is less than the carrying value, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the CGU and then to the other non-financial assets of the CGU proportionately based on the carrying amount of each asset. Any impairment loss is charged to income in the period in which the impairment is identified. Goodwill is stated at cost less accumulated impairment losses. Subsequent reversals of goodwill impairment are prohibited.

Upon disposal of a portion of a CGU, the carrying amount of goodwill related to the portion of the CGU sold is included in the determination of gains or losses on disposal. The carrying amount is determined based on the relative fair value of the disposed portion to the total CGU.

Other intangibles

Intangible assets represent identifiable non-monetary assets and are acquired either separately or through a business combination, or generated internally. Intangible assets acquired through a business combination are recognized separately from goodwill when they are separable or arise from contractual or other legal rights, and their fair value can be measured reliably. The cost of a separately acquired intangible asset includes its purchase price and directly attributable costs of preparing the asset for its intended use. In respect of internally generated intangible assets, cost includes all directly attributable costs necessary to create, produce, and prepare the asset to be capable of operating in the manner intended by management. Research and development costs that are not eligible for capitalization are expensed. After initial recognition, an intangible asset is carried at its cost less any accumulated amortization and accumulated impairment losses, if any. Intangible assets with a finite-life are amortized on a straight-line basis over their estimated useful lives as follows: computer software – 3 to 10 years; and customer list and relationships – 10 to 20 years. We do not have any intangible assets with indefinite lives.

Intangible assets are assessed for indicators of impairment at each reporting period. If there is an indication that an intangible asset may be impaired, an impairment test is performed by comparing the carrying amount of the intangible asset to its recoverable amount. Where it is not possible to estimate the recoverable amount of an individual asset, we estimate the recoverable amount of the CGU to which the asset belongs. If the recoverable amount of the asset (or CGU) is less than its carrying amount, the carrying amount of the intangible asset is written down to its recoverable amount as an impairment loss.

An impairment loss recognized previously is reversed if there is a change in the estimates used to determine the recoverable amount of the asset (or CGU) since the last impairment loss was recognized. If an impairment loss is subsequently reversed, the carrying amount of the asset (or CGU) is revised to the lower of its recoverable amount and the carrying amount that would have been determined (net of amortization) had there been no prior impairment.

Due to the subjective nature of these estimates, significant judgment is required in determining the useful lives and recoverable amounts of our intangible assets, and assessing whether certain events or circumstances constitute objective evidence of impairment. Estimates of the recoverable amounts of our intangible assets rely on certain key inputs, including future cash flows and discount rates. Future cash flows are based on sales projections and allocated costs which are estimated based on forecast results and business initiatives. Discount rates are based on the bank-wide cost of capital, adjusted for asset-specific risks. Changes in these assumptions may impact the amount of impairment loss recognized in Non-interest expense.

Other

Translation of foreign currencies

Monetary assets and liabilities denominated in foreign currencies are translated into Canadian dollars at rates prevailing at the balance sheet date. Foreign exchange gains and losses resulting from the translation and settlement of these items are recognized in Non-interest income in the Consolidated Statements of Income.

Non-monetary assets and liabilities that are measured at historical cost are translated into Canadian dollars at historical rates.

Assets and liabilities of our foreign operations with functional currencies other than Canadian dollars are translated into Canadian dollars at rates prevailing at the balance sheet date, and income and expenses of these foreign operations are translated at average rates of exchange for the reporting period.

Unrealized gains or losses arising as a result of the translation of our foreign operations along with the effective portion of related hedges are reported in Other components of equity on an after-tax basis. Upon disposal or partial disposal of a foreign operation, an appropriate portion of the accumulated net translation gains or losses is included in Non-interest income.

Premises and equipment

Premises and equipment includes land, buildings, leasehold improvements, computer equipment, furniture, fixtures and other equipment, and are stated at cost less accumulated depreciation, except for land which is not depreciated, and accumulated impairment losses. Cost comprises the purchase price, any costs directly attributable to bringing the asset to the location and condition necessary for its intended use, and the initial estimate of any disposal costs. Depreciation is recorded principally on a straight–line basis over the estimated useful lives of the assets, which are 25 to 50 years for buildings, 3 to 10 years for computer equipment, and 5 to 10 years for furniture, fixtures and other equipment. The amortization period for leasehold improvements is the lesser of the useful life of the leasehold improvements or the lease term plus the first renewal period, if reasonably assured of renewal. Depreciation methods, useful lives, and residual values are reassessed at each reporting period and adjusted as appropriate. Gains and losses on disposal are recorded in Non–interest income.

Premises and equipment are assessed for indicators of impairment at each reporting period. If there is an indication that an asset may be impaired, an impairment test is performed by comparing the asset's carrying amount to its recoverable amount.

After the recognition of impairment, the depreciation charge is adjusted in future periods to reflect the asset's revised carrying amount. If an impairment is later reversed, the carrying amount of the asset is revised to the lower of the asset's recoverable amount and the carrying amount that would have been determined (net of depreciation) had there been no prior impairment loss. The depreciation charge in future periods is adjusted to reflect the revised carrying amount.

Right-of-use assets are also included in premises and equipment.

Leasing

At inception of a contract, we assess whether a contract is or contains a lease. A contract is, or contains, a lease if the contract conveys the right to obtain substantially all of the economic benefits from, and direct the use of, an identified asset for a period of time in return for consideration.

When we are the lessee in a lease arrangement, we initially record a right-of-use asset and corresponding lease liability, except for short-term leases and leases of low-value assets. Short-term leases are leases with a lease term of 12 months or less. Low-value assets are unspecialized, common, technologically unsophisticated, widely available, and widely used non-infrastructure assets. For short-term leases and leases of low-value assets, we record the lease payments as an operating expense on a straight-line basis over the lease term.

Where we are reasonably certain to exercise extension and termination options, they are included in the lease term.

The lease liability is initially measured at the present value of the lease payments that are not paid at the commencement date, discounted at our incremental borrowing rate. The lease liability is subsequently measured at amortized cost using the effective interest method, recorded in Interest expense.

The right-of-use asset is initially measured based on the initial amount of the lease liability, adjusted for lease payments made on or before the commencement date, initial direct costs incurred, and an estimate of costs to dismantle, remove, or restore the asset, less any lease incentives received. Costs related to dismantling and removing leasehold improvements are capitalized as part of the leasehold improvement asset (rather than the right-of-use asset of the lease) when the leasehold improvements are separately capitalized.

The right-of-use asset is depreciated to the earlier of the lease term and the useful life, unless ownership will transfer to RBC or we are reasonably certain to exercise a purchase option, in which case the useful life of the right-of-use asset is used. We apply IAS 36 Impairment of assets to determine whether a right-of-use asset is impaired and account for any identified impairment loss as described in the premises and equipment accounting policies above.

Provisions

Provisions are liabilities of uncertain timing or amount and are recognized when we have a present legal or constructive obligation as a result of a past event, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Provisions are measured as the best estimate of the consideration required to settle the present obligation at the reporting date. Significant judgment is required in determining whether a present obligation exists and in estimating the probability, timing and amount of any outflows. We record provisions related to litigation, asset retirement obligations and other items.

We are required to estimate the results of ongoing legal proceedings, and expenses to be incurred to dispose of capital assets. The forward-looking nature of these estimates requires us to use a significant amount of judgment in projecting the timing and amount of future cash flows. We record our provisions on the basis of all available information at the end of the reporting period and make adjustments on a quarterly basis to reflect current expectations. It may not be possible to predict the resolution of these matters or the timing of their ultimate resolution. Should actual results differ from our expectations, we may incur expenses in excess of the provisions recognized. Where appropriate, we apply judgment in limiting the extent of our provisions-related disclosures as not to prejudice our positions in matters of dispute.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, such as an insurer, a separate asset is recognized if it is virtually certain that reimbursement will be received.

Note 2 Summary of significant accounting policies, estimates and judgments (continued)

Commissions and fees
Commissions and fees primarily relate to Investment management and custodial fees, Mutual fund revenue, Securities brokerage commissions, Services charges, Underwriting and other advisory fees, Card service revenue and Credit fees, and are recognized based on the applicable service contracts with clients.

Investment management and custodial fees and Mutual fund revenue are generally calculated as a percentage of daily or period-end net asset values (NAV) based on the terms of the contract with clients and are received monthly, quarterly, semiannually or annually, depending on the terms of the contract. Investment management and custodial fees are generally derived from assets under management (AUM) when our clients solicit the investment capabilities of an investment manager or from assets under administration (AUA) where the investment strategy is directed by the client or a designated third-party manager. Mutual fund revenue is generally derived from the daily NAV of the mutual funds. Investment management and custodial fees and Mutual fund revenue are recognized over time when the service is provided to the client, provided that it is highly probable that a significant reversal in the amount of revenue recognized will not occur.

Commissions earned on Securities brokerage services and Service charges that are related to the provision of specific transaction-type services are recognized when the service is fulfilled. Where services are provided over time, revenue is recognized as the services are provided.

Underwriting and other advisory fees primarily relate to underwriting of new issuances of debt or equity and various advisory services. Underwriting fees are generally expressed as a percentage of the funds raised through issuance and are recognized when the service has been completed. Advisory fees vary depending on the scope and type of engagement and can be fixed in nature or contingent on a future event. Advisory fees are recognized over the period in which the service is provided and are recognized only to the extent that it is highly probable that a significant reversal in the amount of revenue will not occur.

Card service revenue primarily includes interchange revenue and annual card fees. Interchange revenue is calculated as a fixed percentage of the transaction amount and recognized when the card transaction is settled. Annual card fees are fixed fees and are recognized over a 12 month period.

Credit fees are primarily earned for arranging syndicated loans and making credit available on undrawn facilities. The timing of the recognition of credit fees varies based on the nature of the services provided.

When service fees and other costs are incurred in relation to commissions and fees earned, we record these costs on a gross basis in either Non-interest expense – Other or Non-interest expense – Human resources based on our assessment of whether we have primary responsibility to fulfill the contract with the client and have discretion in establishing the price for the commissions and fees earned, which may require judgment.

Earnings per share
Earnings per share is computed by dividing Net income available to common shareholders by the weighted average number of common shares outstanding for the period. Net income available to common shareholders is determined after deducting dividend entitlements of preferred shareholders and distributions on other equity instruments, any gains (losses) on redemption of preferred shares and other equity instruments net of related income taxes and the net income attributable to non-controlling interests.

Diluted earnings per share reflects the potential dilution that could occur if additional common shares are assumed to be issued under securities or contracts that entitle their holders to obtain common shares in the future, to the extent such entitlement is not subject to unresolved contingencies. For contracts that may be settled in cash or in common shares at our option, diluted earnings per share is calculated based on the assumption that such contracts will be settled in shares. Income and expenses associated with these types of contracts are excluded from the Net income available to common shareholders, and the additional number of shares that would be issued is included in the diluted earnings per share calculation. For stock options whose exercise price is less than the average market price of our common shares, using the treasury stock method, they are assumed to be exercised and the proceeds are used to repurchase common shares at the average market price for the period. The incremental number of common shares issued under stock options and repurchased from proceeds is included in the calculation of diluted earnings per share.

Share capital and other equity instruments
We classify a financial instrument that we issue as a financial asset, financial liability or an equity instrument in accordance with the substance of the contractual arrangement.

Our common shares held by us are classified as treasury shares in equity and accounted for at weighted average cost. Upon the sale of treasury shares, the difference between the sale proceeds and the cost of the shares is recognized in Retained earnings. Financial instruments issued by us are classified as equity instruments when there is no contractual obligation to transfer cash or other financial assets. Incremental costs directly attributable to the issue of equity instruments are included in equity as a deduction from the proceeds, net of tax. Financial instruments that will be settled by a variable number of our common shares upon their conversion by the holders as well as the related accrued distributions are classified as liabilities on our Consolidated Balance Sheets. Dividends and yield distributions on these instruments are classified as Interest expense in our Consolidated Statements of Income. For compound instruments comprised of both liability and equity components, the liability component is initially measured at fair value with any residual amount assigned to the equity component.

Future changes in accounting policy and disclosure
The following standard has been issued, but is not yet effective for us.

IFRS 17 *Insurance Contracts* (IFRS 17)
In May 2017, the IASB issued IFRS 17 to establish a comprehensive insurance standard which provides guidance on the recognition, measurement, presentation and disclosures of insurance contracts. IFRS 17 requires entities to measure insurance contract liabilities at their current fulfillment values using one of three approaches depending on the nature of the contract. In June 2020, the IASB issued amendments to IFRS 17, including deferral of the effective date by two years. This new standard will be effective for us on November 1, 2023 and will be applied retrospectively with restatement of comparatives. If full retrospective

application to a group of contracts is impracticable, the modified retrospective or fair value approach may be used. To manage the transition to IFRS 17, we established a comprehensive program and governance structure led by Finance and the Insurance business that focuses on the evaluation of the impacts of the standard and implementation of policies, systems and processes required for the adoption. Significant progress has been made in preparing for the implementation of IFRS 17. We expect the adoption of IFRS 17 to affect the timing of earnings recognition for our insurance contracts and the carrying amount of our insurance contract liabilities. We continue to assess the impacts of adopting IFRS 17 on our Consolidated Financial Statements.

Updates related to interest rate benchmark reform

On May 16, 2022, Refinitiv Benchmark Services (UK) Limited (RBSL), the administrator of CDOR, announced that the calculation and publication of all tenors of CDOR will permanently cease immediately following a final publication on June 28, 2024. The cessation announcement triggered fallback provisions related to our CDOR-linked products, including certain loans, bonds, and derivatives, and defined the dates of their transition to ABRs. The fixed spreads to be used in the transition to the relevant ABR for each CDOR setting were also defined for certain of our CDOR-linked products as a result of the announcement.

Progress in and risks arising from the transition to ABRs

To manage our transition to ABRs, we have implemented a comprehensive enterprise-wide program and governance structure that addresses the key areas of impact including contract remediation, funding and liquidity planning, risk management, financial reporting and valuation, systems, processes and client education and communication. Transition activities are focused on two broad streams of work: (i) developing new ABR linked products, and (ii) conversion of existing USD LIBOR and CDOR based contracts to ABRs. Our program timelines are ultimately dependent on broader market acceptance of products that reference the new ABRs and our clients' readiness and ability to adopt the replacement products. Significant matters that we continue to evaluate include client product offerings, short and long-term funding strategies, and our hedging programs. We continue to work towards the recommended target dates for the cessation of USD LIBOR and CDOR based products provided by our regulators and are on track with our transition activities to move to ABRs.

The following tables show the Bank's significant exposures to financial instruments referencing benchmark interest rates subject to the Reform that have yet to transition to ABRs. These include financial instruments referencing USD LIBOR maturing after June 30, 2023 and CDOR maturing after June 28, 2024. In the normal course of business, our derivative notional amounts may fluctuate with minimal impact to our IBOR conversion plans.

	As at					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars)	**Non-derivative financial assets** (1)	**Non-derivative financial liabilities** (2)	**Derivative notional** (3)	Non-derivative financial assets (1)	Non-derivative financial liabilities (2)	Derivative notional (3), (4)
USD LIBOR	**$ 57,494**	**$ 1,468**	**$ 5,550,175**	$ 68,325	$ 1,420	$ 4,901,854
CDOR (5)	**18,493**	**18,572**	**2,004,444**	9,226	14,797	1,307,071
	$ 75,987	**$ 20,040**	**$ 7,554,619**	$ 77,551	$ 16,217	$ 6,208,925
Cross currency swaps						
USD LIBOR – CDOR	**n.a.**	**n.a.**	**$ 222,256**	n.a.	n.a.	$ 206,953
	n.a.	**n.a.**	**$ 222,256**	n.a.	n.a.	$ 206,953
	$ 75,987	**$ 20,040**	**$ 7,776,875**	$ 77,551	$ 16,217	$ 6,415,878

(1) Non-derivative assets represent the drawn outstanding balance of Loans and Customers' liability under acceptances and the fair value of Securities.

(2) Non-derivative liabilities represent Subordinated debentures, Deposits and Acceptances.

(3) The notional amount for cross currency swaps between USD LIBOR and CDOR are presented separately in the Cross currency swaps section of this table.

(4) Amounts have been updated from those previously presented to reflect the regulatory developments related to the cessation of CDOR and transition of non-USD LIBOR financial instruments.

(5) Includes our exposure to financial instruments referencing interest rates substantially similar to CDOR.

n.a. not applicable

The following table presents the undrawn balances of loan commitments referencing benchmark interest rates subject to the Reform.

	As at	
(Millions of Canadian dollars)	**October 31, 2022**	October 31, 2021
Authorized and committed undrawn commitments		
USD LIBOR	**$ 59,271**	$ 122,437
CDOR (1), (2)	**26,913**	15,644
	$ 86,184	$ 138,081

(1) Includes our exposure to financial instruments referencing interest rates substantially similar to CDOR.

(2) Undrawn commitments exclude amounts related to drawn outstanding balances, which in certain cases may exclude extension options.

Consistent with our transition plan, our exposure to non-derivative financial assets, non-derivative financial liabilities, derivative notional and undrawn balances of loan commitments referencing non-USD LIBOR interest rates is no longer material to our financial statements (October 31, 2021 – $3.6 billion, $3.4 billion, $2,975.4 billion and $3.0 billion, respectively). We continue to manage significant exposures to benchmarks that have no announced plans for cessation or further reform, including the EURO Interbank Offered Rate (EURIBOR) and Australian Bank Bill Swap Rate (BBSW), which are excluded from the tables above.

Table of Contents

Note 3 Fair value of financial instruments

Carrying value and fair value of financial instruments

The following tables provide a comparison of the carrying and fair values for each classification of financial instruments. Embedded derivatives are presented on a combined basis with the host contracts. For measurement purposes, they are carried at fair value when conditions requiring separation are met.

	As at October 31, 2022							
	Carrying value and fair value				Carrying value	Fair value		
(Millions of Canadian dollars)	Financial instruments classified as FVTPL	Financial instruments designated as FVTPL	Financial instruments classified as FVOCI	Financial instruments designated as FVOCI	Financial instruments measured at amortized cost	Financial instruments measured at amortized cost	Total carrying amount	Total fair value
Financial assets								
Interest-bearing deposits with banks	$ –	$ 84,468	$ –	$ –	$ 23,543	$ 23,543	$ 108,011	$ 108,011
Securities								
Trading	138,507	9,698	–	–	–	–	148,205	148,205
Investment, net of applicable allowance	–	–	92,063	828	77,127	70,073	170,018	162,964
	138,507	9,698	92,063	828	77,127	70,073	318,223	311,169
Assets purchased under reverse repurchase agreements and securities borrowed	264,665	–	–	–	53,180	53,180	317,845	317,845
Loans, net of applicable allowance								
Retail	73	375	218	–	546,767	521,428	547,433	522,094
Wholesale	6,914	3,222	563	–	261,833	253,816	272,532	264,515
	6,987	3,597	781	–	808,600	775,244	819,965	786,609
Other								
Derivatives	154,439	–	–	–	–	–	154,439	154,439
Other assets (1)	3,377	–	–	–	73,084	73,084	76,461	76,461
Financial liabilities								
Deposits								
Personal	$ 298	$ 21,959			$ 382,675	$ 380,396	$ 404,932	$ 402,653
Business and government (2)	447	152,119			607,304	605,102	759,870	757,668
Bank (3)	–	7,196			36,816	36,758	44,012	43,954
	745	181,274			1,026,795	1,022,256	1,208,814	1,204,275
Other								
Obligations related to securities sold short	35,511	–			–	–	35,511	35,511
Obligations related to assets sold under repurchase agreements and securities loaned	–	248,835			25,112	25,112	273,947	273,947
Derivatives	153,491	–			–	–	153,491	153,491
Other liabilities (4)	(360)	69			90,348	90,160	90,057	89,869
Subordinated debentures	–	–			10,025	9,668	10,025	9,668

(Millions of Canadian dollars)	As at October 31, 2021							
	Carrying value and fair value				Carrying value	Fair value		
	Financial instruments classified as FVTPL	Financial instruments designated as FVTPL	Financial instruments classified as FVOCI	Financial instruments designated as FVOCI	Financial instruments measured at amortized cost	Financial instruments measured at amortized cost	Total carrying amount	Total fair value
Financial assets								
Interest-bearing deposits with banks	$ –	$ 56,896	$ –	$ –	$ 22,742	$ 22,742	$ 79,638	$ 79,638
Securities								
Trading	125,801	13,439	–	–	–	–	139,240	139,240
Investment, net of applicable allowance	–	–	77,802	533	67,149	66,823	145,484	145,158
	125,801	13,439	77,802	533	67,149	66,823	284,724	284,398
Assets purchased under reverse repurchase agreements and securities borrowed	265,011	–	–	–	42,892	42,892	307,903	307,903
Loans, net of applicable allowance								
Retail	–	241	327	–	500,621	502,277	501,189	502,845
Wholesale	8,428	2,769	813	–	204,376	204,683	216,386	216,693
	8,428	3,010	1,140	–	704,997	706,960	717,575	719,538
Other								
Derivatives	95,541	–	–	–	–	–	95,541	95,541
Other assets (1)	4,109	–	–	–	58,483	58,483	62,592	62,592
Financial liabilities								
Deposits								
Personal	$ 321	$ 18,328			$ 343,839	$ 344,040	$ 362,488	$ 362,689
Business and government (2)	739	131,630			563,984	565,106	696,353	697,475
Bank (3)	–	17,251			24,739	24,743	41,990	41,994
	1,060	167,209			932,562	933,889	1,100,831	1,102,158
Other								
Obligations related to securities sold short	37,841	–			–	–	37,841	37,841
Obligations related to assets sold under repurchase agreements and securities loaned	–	236,147			26,054	26,054	262,201	262,201
Derivatives	91,439	–			–	–	91,439	91,439
Other liabilities (4)	654	171			64,746	64,749	65,571	65,574
Subordinated debentures	–	–			9,593	9,601	9,593	9,601

(1) Includes Customers' liability under acceptances and financial instruments recognized in Other assets.

(2) Business and government deposits include deposits from regulated deposit-taking institutions other than banks.

(3) Bank deposits refer to deposits from regulated banks and central banks.

(4) Includes Acceptances and financial instruments recognized in Other liabilities.

Financial assets designated as fair value through profit or loss

For our financial assets designated as FVTPL, we measure the change in fair value attributable to changes in credit risk as the difference between the total change in the fair value of the instrument during the period and the change in fair value calculated using the appropriate risk-free yield curves. For the year ended October 31, 2022, the change in fair value during the period attributable to changes in credit risk for positions still held was a loss of $662 million and the cumulative change in fair value attributable to changes in credit risk for positions still held was a loss of $490 million. For the year ended October 31, 2021, the change in fair value during the period attributable to changes in credit risk for positions still held was a gain of $613 million and the cumulative change in fair value attributable to changes in credit risk for positions still held was a gain of $173 million. As at October 31, 2022, the extent to which credit derivatives or similar instruments mitigate the maximum exposure to credit risk was $589 million (October 31, 2021 – $484 million).

Financial liabilities designated as fair value through profit or loss

For our financial liabilities designated as FVTPL, we take into account changes in our own credit spread and the expected duration of the instrument to measure the change in fair value attributable to changes in credit risk.

(Millions of Canadian dollars)	**As at or for the year ended October 31, 2022** (1)				
	Contractual maturity amount	**Carrying value**	**Difference between carrying value and contractual maturity amount**	**Changes in fair value attributable to changes in credit risk included in OCI for positions still held**	
				During the period	**Cumulative** (2)
Term deposits					
Personal	**$ 22,328**	**$ 21,959**	**$ (369)**	**$ (238)**	**$ (166)**
Business and government (3)	**160,775**	**152,119**	**(8,656)**	**(2,135)**	**(1,718)**
Bank (4)	**7,208**	**7,196**	**(12)**	**–**	**–**
	190,311	**181,274**	**(9,037)**	**(2,373)**	**(1,884)**
Obligations related to assets sold under repurchase agreements and securities loaned	**248,963**	**248,835**	**(128)**	**1**	**1**
Other liabilities	**69**	**69**	**–**	**–**	**–**
	$439,343	**$ 430,178**	**$ (9,165)**	**$ (2,372)**	**$ (1,883)**

Note 3 Fair value of financial instruments (continued)

(Millions of Canadian dollars)	As at or for the year ended October 31, 2021 (1)				
	Contractual maturity amount	Carrying value	Difference between carrying value and contractual maturity amount	Changes in fair value attributable to changes in credit risk included in OCI for positions still held	
				During the period	Cumulative (2)
Term deposits					
Personal	$ 18,205	$ 18,328	$ 123	$ (17)	$ 72
Business and government (3)	131,830	131,630	(200)	(75)	416
Bank (4)	17,253	17,251	(2)	–	–
	167,288	167,209	(79)	(92)	488
Obligations related to assets sold under repurchase agreements and securities loaned	236,164	236,147	(17)	(8)	–
Other liabilities	171	171	–	–	–
	$403,623	$ 403,527	$ (96)	$ (100)	$ 488

(1) $97 million in changes in fair value attributable to changes in credit risk were recognized in income for the year ended October 31, 2022, and $57 million in cumulative changes in credit risk were included in income for positions still held life-to-date (October 31, 2021 – $nil and $nil respectively).
(2) The cumulative change is measured from the initial designation of the liabilities as FVTPL. For the year ended October 31, 2022, $3 million of fair value gains previously included in OCI relate to financial liabilities derecognized during the year (October 31, 2021 – $25 million of fair value losses).
(3) Business and government term deposits include amounts from regulated deposit-taking institutions other than regulated banks.
(4) Bank term deposits refer to amounts from regulated banks and central banks.

Net gains (losses) from financial instruments classified and designated as fair value through profit or loss

Financial instruments classified as FVTPL, which includes mainly trading securities, derivatives, trading liabilities, and financial assets and liabilities designated as FVTPL are measured at fair value with realized and unrealized gains and losses recognized in Non-interest income.

(Millions of Canadian dollars)	For the year ended	
	October 31 2022	October 31 2021
Net gains (losses) (1)		
Classified as fair value through profit or loss (2)	**$ (7,382)**	$ 3,447
Designated as fair value through profit or loss (3)	**8,543**	(1,407)
	$ 1,161	$ 2,040
By product line (1)		
Interest rate and credit (4)	**$ 1,251**	$ 1,033
Equities	**(843)**	57
Foreign exchange and commodities	**753**	950
	$ 1,161	$ 2,040

(1) Excludes the following amounts related to our insurance operations and included in Insurance premiums, investment and fee income in the Consolidated Statements of Income: Net losses from financial instruments designated as FVTPL of $2,805 million (October 31, 2021 – losses of $14 million).
(2) Excludes derivatives designated in a hedging relationship. Refer to Note 9 for net gains (losses) on these derivatives.
(3) For the year ended October 31, 2022, $8,536 million of net fair value gains on financial liabilities designated as FVTPL, other than those attributable to changes in our own credit risk, were included in Non-interest income (October 31, 2021 – losses of $1,408 million).
(4) Includes gains (losses) recognized on cross currency interest rate swaps.

Net interest income from financial instruments

Interest and dividend income arising from financial assets and financial liabilities and the associated costs of funding are reported in Net interest income.

(Millions of Canadian dollars)	For the year ended	
	October 31 2022	October 31 2021
Interest and dividend income (1), (2)		
Financial instruments measured at fair value through profit or loss	**$ 10,999**	$ 4,551
Financial instruments measured at fair value through other comprehensive income	**1,177**	375
Financial instruments measured at amortized cost	**28,595**	23,219
	40,771	28,145
Interest expense (1)		
Financial instruments measured at fair value through profit or loss	**$ 8,336**	$ 2,865
Financial instruments measured at amortized cost (3)	**9,718**	5,278
	18,054	8,143
Net interest income	**$ 22,717**	$ 20,002

(1) Excludes the following amounts related to our insurance operations and included in Insurance premiums, investment and fee income in the Consolidated Statements of Income: Interest income of $601 million (October 31, 2021 – $576 million), and Interest expense of $6 million (October 31, 2021 – $4 million).
(2) Includes dividend income for the year ended October 31, 2022 of $2,954 million (October 31, 2021 – $2,436 million), which is presented in Interest and dividend income in the Consolidated Statements of Income.
(3) Includes interest expense on lease liabilities for the year ended October 31, 2022 of $112 million (October 31, 2021 – $110 million).

Fee income arising from financial instruments

For the year ended October 31, 2022, we earned $6,118 million in fees from banking services (October 31, 2021 – $5,583 million). For the year ended October 31, 2022, we also earned $14,932 million in fees from investment management, trust, custodial, underwriting, brokerage and other similar fiduciary services to retail and institutional clients (October 31, 2021 – $15,167 million). These fees are included in Non-interest income.

Fair value of assets and liabilities measured at fair value on a recurring basis and classified using the fair value hierarchy

	As at									
	October 31, 2022					October 31, 2021				
	Fair value measurements using			Netting		Fair value measurements using			Netting	
(Millions of Canadian dollars)	Level 1	Level 2	Level 3	adjustments	Fair value	Level 1	Level 2	Level 3	adjustments	Fair value
Financial assets										
Interest-bearing deposits with banks	$ –	$ 84,468	$ –	$	$ 84,468	$ –	$ 56,896	$ –	$	$ 56,896
Securities										
Trading										
Debt issued or guaranteed by:										
Canadian government (1)										
Federal	15,024	3,779	–		18,803	8,977	2,380	–		11,357
Provincial and municipal	–	13,257	–		13,257	–	11,068	–		11,068
U.S. federal, state, municipal and agencies (1) , (2)	1,254	35,570	4		36,828	215	22,738	25		22,978
Other OECD government (3)	1,325	3,452	–		4,777	2,729	5,730	–		8,459
Mortgage-backed securities (1)	–	2	–		2	–	4	–		4
Asset-backed securities										
Non-CDO securities (4)	–	1,308	2		1,310	–	891	2		893
Corporate debt and other debt	–	21,162	7		21,169	–	23,085	25		23,110
Equities	46,592	3,593	1,874		52,059	56,826	3,015	1,530		61,371
	64,195	82,123	1,887		148,205	68,747	68,911	1,582		139,240
Investment										
Debt issued or guaranteed by:										
Canadian government (1)										
Federal	1,226	2,555	–		3,781	1,973	1,730	–		3,703
Provincial and municipal	–	2,124	–		2,124	–	3,132	–		3,132
U.S. federal, state, municipal and agencies (1) , (2)	440	43,918	–		44,358	12	34,815	–		34,827
Other OECD government	–	5,144	–		5,144	–	5,956	–		5,956
Mortgage-backed securities (1)	–	2,860	28		2,888	–	2,727	20		2,747
Asset-backed securities										
CDO	–	7,524	–		7,524	–	7,074	–		7,074
Non-CDO securities	–	524	–		524	–	586	–		586
Corporate debt and other debt	–	25,569	151		25,720	–	19,625	152		19,777
Equities	36	395	397		828	46	153	334		533
	1,702	90,613	576		92,891	2,031	75,798	506		78,335
Assets purchased under reverse repurchase agreements and securities borrowed	–	264,665	–		264,665	–	265,011	–		265,011
Loans	–	9,673	1,692		11,365	–	11,501	1,077		12,578
Other										
Derivatives										
Interest rate contracts	–	39,804	263		40,067	–	33,857	320		34,177
Foreign exchange contracts	–	99,424	13		99,437	–	41,224	74		41,298
Credit derivatives	–	388	–		388	–	34	–		34
Other contracts	3,939	14,786	62		18,787	3,175	17,955	26		21,156
Valuation adjustments	–	(2,100)	45		(2,055)	–	(819)	9		(810)
Total gross derivatives	3,939	152,302	383		156,624	3,175	92,251	429		95,855
Netting adjustments				(2,185)	(2,185)				(314)	(314)
Total derivatives					154,439					95,541
Other assets	1,221	2,141	15		3,377	1,474	2,635	–		4,109
	$ 71,057	$ 685,985	$ 4,553	$ (2,185)	$ 759,410	$ 75,427	$ 573,003	$ 3,594	$ (314)	$ 651,710
Financial liabilities										
Deposits										
Personal	$ –	$ 22,016	$ 241	$	$ 22,257	$ –	$ 18,498	$ 151	$	$ 18,649
Business and government	–	152,566	–		152,566	–	132,369	–		132,369
Bank	–	7,196	–		7,196	–	17,251	–		17,251
Other										
Obligations related to securities sold short	16,383	19,128	–		35,511	18,345	19,496	–		37,841
Obligations related to assets sold under repurchase agreements and securities loaned	–	240,835	–		240,835	–	236,147	–		236,147
Derivatives										
Interest rate contracts	–	39,592	1,122		40,714	–	28,566	955		29,521
Foreign exchange contracts	–	94,310	145		94,455	–	40,484	27		40,511
Credit derivatives	–	125	–		125	–	120	–		120
Other contracts	3,847	16,663	847		21,357	3,699	17,456	419		21,574
Valuation adjustments	–	(967)	(8)		(975)	–	38	(11)		27
Total gross derivatives	3,847	149,723	2,106		155,676	3,699	86,664	1,390		91,753
Netting adjustments				(2,185)	(2,185)				(314)	(314)
Total derivatives					153,491					91,439
Other liabilities	341	(632)	–		(291)	258	560	7		825
	$ 20,571	$ 598,832	$ 2,347	$ (2,185)	$ 619,565	$ 22,302	$ 510,985	$ 1,548	$ (314)	$ 534,521

(1) As at October 31, 2022, residential and commercial mortgage-backed securities (MBS) included in all fair value levels of trading securities were $2,273 million and $nil (October 31, 2021 – $13,124 million and $nil), respectively, and in all fair value levels of Investment securities were $23,362 million and $2,755 million (October 31, 2021 – $13,542 million and $2,592 million), respectively.

(2) United States (U.S.).

(3) Organisation for Economic Co-operation and Development (OECD).

(4) Collateralized debt obligations (CDO).

Note 3 Fair value of financial instruments (continued)

Fair values of our significant assets and liabilities measured on a recurring basis are determined and classified in the fair value hierarchy table using the following valuation techniques and inputs.

Interest-bearing deposits with banks
The majority of our Interest-bearing deposits with banks are designated as FVTPL. These FVTPL deposits are composed of short-dated deposits placed with banks, and are included in Interest-bearing deposits with banks in the fair value hierarchy table. The fair values of these instruments are determined using the discounted cash flow method. The inputs to the valuation models include interest rate swap curves and credit spreads, where applicable. They are classified as Level 2 instruments in the hierarchy as the inputs are observable.

Government bonds (Canadian, U.S. and other OECD governments)
Government bonds are included in Canadian government debt, U.S. federal, state, municipal and agencies debt, Other OECD government debt and Obligations related to securities sold short in the fair value hierarchy table. The fair values of government issued or guaranteed debt securities in active markets are determined by reference to recent transaction prices, broker quotes, or third-party vendor prices and are classified as Level 1 in the hierarchy. The fair values of securities that are not traded in active markets are based on either security prices, or valuation techniques using implied yields and risk spreads derived from prices of actively traded and similar government securities. Securities with observable prices or rate inputs as compared to transaction prices, dealer quotes or vendor prices are classified as Level 2 in the hierarchy. Securities where inputs are unobservable are classified as Level 3 in the hierarchy.

Corporate and U.S. municipal bonds
The fair values of corporate and U.S. municipal bonds, which are included in Corporate debt and other debt, U.S. federal, state, municipal and agencies debt and Obligations related to securities sold short in the fair value hierarchy table, are determined using either recently executed transaction prices, broker quotes, pricing services, or in certain instances, the discounted cash flow method using rate inputs such as benchmark yields (CDOR, Secured Overnight Financing Rate (SOFR) and other similar reference rates) and risk spreads of comparable securities. Securities with observable prices or rate inputs are classified as Level 2 in the hierarchy. Securities where inputs are unobservable are classified as Level 3 in the hierarchy.

Asset-backed securities and Mortgage-backed securities
Asset-backed securities (ABS) and MBS are included in Asset-backed securities, Mortgage-backed securities, Canadian government debt, U.S. federal, state, municipal and agencies debt, and Obligations related to securities sold short in the fair value hierarchy table. Inputs for valuation of ABS and MBS are, when available, traded prices, dealer or lead manager quotes, broker quotes and vendor prices of the identical securities. When prices of the identical securities are not readily available, we use industry standard models with inputs such as discount margins, yields, default, prepayment and loss severity rates that are implied from transaction prices, dealer quotes or vendor prices of comparable instruments. Where security prices and inputs are observable, ABS and MBS are classified as Level 2 in the hierarchy. Otherwise, they are classified as Level 3 in the hierarchy.

Equities
Equities consist of listed and unlisted common shares, private equities, mutual funds and hedge funds with certain redemption restrictions and are included in equities and obligations for securities sold short. The fair values of common shares are based on quoted prices in active markets, where available, and are classified as Level 1 in the hierarchy. Where quoted prices in active markets are not readily available, fair value is determined based on quoted market prices for similar securities or through valuation techniques, such as multiples of earnings and the discounted cash flow method with forecasted cash flows and discount rate as inputs. Private equities are classified as Level 3 in the hierarchy as their inputs are not observable. Hedge funds are valued using Net Asset Values (NAV). If we can redeem a hedge fund at NAV prior to the next quarter end, the fund is classified as Level 2 in the hierarchy. Otherwise, it is classified as Level 3 in the hierarchy.

Loans
Loans include base metal loans, corporate loans, banker acceptances and asset-backed financing loans. Fair values are determined based on market prices, if available, or discounted cash flow method using the following inputs: market interest rates, base metal commodity prices, market based spreads of assets with similar credit ratings and terms to maturity, LGD, expected default frequency implied from credit derivative prices, if available, and relevant pricing information such as contractual rate, origination and maturity dates, redemption price, coupon payment frequency and day count convention. Loans with market prices or observable inputs are classified as Level 2 in the hierarchy and loans with unobservable inputs that have significant impacts on the fair values are classified as Level 3 in the hierarchy.

Derivatives
The fair values of exchange-traded derivatives, such as interest rate and equity options and futures, are based on quoted market prices and are typically classified as Level 1 in the hierarchy. OTC derivatives primarily consist of interest rate contracts, foreign exchange contracts and credit derivatives. The exchange-traded or OTC interest rate, foreign exchange and equity derivatives are included in Interest rate contracts, Foreign exchange contracts and Other contracts, respectively, in the fair value hierarchy table. The fair values of OTC derivatives are determined using valuation models when quoted market prices or third-party consensus pricing information are not available. The valuation models, such as discounted cash flow method or Black-Scholes option model, incorporate observable or unobservable inputs for interest and foreign exchange rates, equity and commodity prices (including indices), credit spreads, corresponding market volatility levels, and other market-based pricing factors. Other adjustments to fair value include bid-offer, CVA, FVA, OIS, parameter and model uncertainties, and unrealized gain or loss at inception of a transaction. A derivative instrument is classified as Level 2 in the hierarchy if observable market inputs are available or the unobservable inputs are not significant to the fair value. Otherwise, it is classified as Level 3 in the hierarchy.

Securities borrowed or purchased under resale agreements and securities loaned or sold under repurchase agreements
In the fair value hierarchy table, these instruments are included in Assets purchased under reverse repurchase agreements and securities borrowed, and Obligations related to assets sold under repurchase agreements and securities loaned. The fair values

of these contracts are determined using valuation techniques such as the discounted cash flow method using interest rate curves as inputs. They are classified as Level 2 instruments in the hierarchy as the inputs are observable.

Deposits

A majority of our deposits are measured at amortized cost but certain deposits are designated as FVTPL. These FVTPL deposits include deposits taken from clients, issuances of certificates of deposits and promissory notes, and interest rate and equity linked notes. The fair values of these instruments are determined using the discounted cash flow method and derivative option valuation models. The inputs to the valuation models include benchmark yield curves, credit spreads, interest rates, equity and interest rate volatility, dividends and correlation, where applicable. They are classified as Level 2 or 3 instruments in the hierarchy, depending on the significance of the unobservable credit spreads, volatility, dividend and correlation rates.

Quantitative information about fair value measurements using significant unobservable inputs (Level 3 Instruments)

The following table presents fair values of our significant Level 3 financial instruments, valuation techniques used to determine their fair values, ranges and weighted averages of unobservable inputs.

As at October 31, 2022 (Millions of Canadian dollars, except for prices, percentages and ratios)

		Fair value				Range of input values (1), (2)		
Products	Reporting line in the fair value hierarchy table	Assets	Liabilities	Valuation techniques	Significant unobservable inputs (3)	Low	High	Weighted average / Inputs distribution
Corporate debt and related derivatives				Price-based	Prices	$ 1.00	$ 111.90	$ 85.64
	Corporate debt and other debt	$ 7		Discounted cash flows	Credit spread	1.67%	10.73%	6.20%
	Loans	1,692			Credit enhancement	11.70%	15.60%	13.00%
	Derivative related liabilities		$ 130					
Government debt and municipal bonds								
	Corporate debt and other debt	151		Discounted cash flows	Yields	7.85%	10.72%	8.92%
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	3.97X	14.31X	8.59X
	Equities	2,271		Price-based	P/E multiples	8.47X	24.04X	12.46X
	Derivative related liabilities		2	Discounted cash flows	EV/Rev multiples	0.35X	5.77X	3.88X
					Liquidity discounts (4)	10.00%	40.00%	17.35%
					Discount rate	10.80%	10.80%	10.80%
					NAV / prices (5)	n.a.	n.a.	n.a.
Interest rate derivatives and interest-rate-linked structured notes (6), (7)				Discounted cash flows	Interest rates	1.68%	4.49%	High
	Derivative related assets	270		Option pricing model	CPI swap rates	1.98%	2.59%	Even
	Derivative related liabilities		1,216		IR-IR correlations	19.00%	67.00%	Even
					FX-IR correlations	29.00%	56.00%	Even
					FX-FX correlations	68.00%	68.00%	Even
Equity derivatives and equity-linked structured notes (6), (7)				Discounted cash flows	Dividend yields	(0.63)%	8.28%	Lower
	Derivative related assets	62		Option pricing model	Equity (EQ)-EQ correlations	33.00%	94.90%	Middle
	Deposits		241		EQ-FX correlations	(83.15)%	38.44%	Middle
	Derivative related liabilities		655		EQ volatilities	7.00%	129.00%	Upper
Other (8)								
	Asset-backed securities	2						
	Derivative related assets	51						
	Other assets	15						
	Mortgage-backed securities	28						
	U.S. state, municipal and agencies debt	4						
	Derivative related liabilities		103					
	Other liabilities		–					
Total		$ 4,553	$ 2,347					

Note 3 Fair value of financial instruments (continued)

As at October 31, 2021 (Millions of Canadian dollars, except for prices, percentages and ratios)

		Fair value				Range of input values (1), (2)		
Products	Reporting line in the fair value hierarchy table	Assets	Liabilities	Valuation techniques	Significant unobservable inputs (3)	Low	High	Weighted average / Inputs distribution
Corporate debt and related derivatives				Price-based	Prices	$ 29.18	$ 127.09	$ 96.36
	Corporate debt and other debt	$ 27		Discounted cash flows	Credit spread	1.15%	6.82%	4.04%
	Loans	1,077			Credit enhancement	11.92%	15.90%	13.25%
	Derivative related liabilities		$ 9					
Government debt and municipal bonds								
	Corporate debt and other debt	150		Discounted cash flows	Yields	3.91%	8.17%	5.91%
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	8.82X	26.00X	9.16X
	Equities	1,864		Price-based	P/E multiples	9.40X	38.00X	10.96X
	Derivative related liabilities		2	Discounted cash flows	EV/Rev multiples	1.14X	20.80X	5.40X
					Liquidity discounts (4)	10.00%	40.00%	16.40%
					Discount rate	10.65%	10.65%	10.65%
					NAV / prices (5)	n.a.	n.a.	n.a.
Interest rate derivatives and interest-rate-linked structured notes (6), (7)				Discounted cash flows	Interest rates	0.13%	2.46%	High
	Derivative related assets	367		Option pricing model	CPI swap rates	1.76%	2.42%	Even
	Derivative related liabilities		974		IR-IR correlations	19.00%	67.00%	Even
					FX-IR correlations	29.00%	56.00%	Even
					FX-FX correlations	68.00%	68.00%	Even
Equity derivatives and equity-linked structured notes (6), (7)				Discounted cash flows	Dividend yields	0.00%	6.37%	Lower
	Derivative related assets	25		Option pricing model	Equity (EQ)-EQ correlations	32.00%	95.00%	Middle
	Deposits		151		EQ-FX correlations	(60.60)%	27.30%	Middle
	Derivative related liabilities		381		EQ volatilities	8.00%	128.00%	Upper
Other (8)								
	Asset-backed securities	2						
	Derivative related assets	37						
	Other assets	–						
	Mortgage-backed securities	20						
	U.S. state, municipal and agencies debt	25						
	Derivative related liabilities		24					
	Other liabilities		7					
Total		$3,594	$ 1,548					

(1) The low and high input values represent the actual highest and lowest level inputs used to value a group of financial instruments in a particular product category. These input ranges do not reflect the level of input uncertainty, but are affected by the different underlying instruments within the product category. The input ranges will therefore vary from period to period based on the characteristics of the underlying instruments held at each balance sheet date. Where provided, the weighted average of the input values is calculated based on the relative fair values of the instruments within the product category. The weighted averages for derivatives are not presented in the table as they would not provide a comparable metric; instead, distribution of significant unobservable inputs within the range for each product category is indicated in the table.

(2) Price-based inputs are significant for certain debt securities and are based on external benchmarks, comparable proxy instruments orpre-quarter-end trade data. For these instruments, the price input is expressed in dollars for each $100 par value. For example, with an input price of $105, an instrument is valued at a premium over its par value.

(3) The significant unobservable inputs include the following: (i) Enterprise Value (EV); (ii) Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA); (iii) Price / Earnings (P/E); (iv) Revenue (Rev); (v) Consumer Price Index (CPI); (vi) Interest Rate (IR); (vii) Foreign Exchange (FX); and (viii) Equity (EQ).

(4) Fair value of securities with liquidity discount inputs totalled $373 million (October 31, 2021 – $885 million).

(5) NAV of a hedge fund is total fair value of assets less liabilities divided by the number of fund units. Private equities are valued based on NAV or valuation techniques. The range for NAV per unit or price per share has not been disclosed for the hedge funds or private equities due to the dispersion of prices given the diverse nature of the investments.

(6) The level of aggregation and diversity within each derivative instrument category may result in certain ranges of inputs being wide and inputs being unevenly distributed across the range. In the table, we indicated whether the majority of the inputs are concentrated toward the upper, middle, or lower end of the range, or evenly distributed throughout the range.

(7) The structured notes contain embedded equity or interest rate derivatives with unobservable inputs that are similar to those of the equity or interest rate derivatives.

(8) Other primarily includes certain insignificant instruments such as auction rate securities, commodity derivatives, foreign exchange derivatives, contingent considerations, bank-owned life insurance and retractable shares.

n.a. not applicable

Sensitivity to unobservable inputs and interrelationships between unobservable inputs

Yield, credit spreads/discount margins

A financial instrument's yield is the interest rate used to discount future cash flows in a valuation model. An increase in the yield, in isolation, would result in a decrease in a fair value measurement and vice versa. A credit spread/discount margin is the difference between a debt instrument's yield and a benchmark instrument's yield. Benchmark instruments have high credit quality ratings, similar maturities and are often government bonds. The credit spread/discount margin therefore represents the discount rate used to determine the present value of future cash flows of an asset to reflect the market return required for uncertainty in the estimated cash flows. The credit spread/discount margin for an instrument forms part of the yield used in a discounted cash flow method.

Funding spread

Funding spreads are credit spreads specific to funding or deposit rates. A decrease in funding spreads, on its own, will increase the fair value of our liabilities, and vice versa.

Default rates

A default rate is the rate at which borrowers fail to make scheduled loan payments. A decrease in the default rate will typically increase the fair value of the loan, and vice versa. This effect will be significantly more pronounced for a non-government guaranteed loan than a government guaranteed loan.

Prepayment rates
A prepayment rate is the rate at which a loan will be repaid in advance of its expected amortization schedule. Prepayments change the future cash flows of a loan. An increase in the prepayment rate in isolation will result in an increase in fair value when the loan interest rate is lower than the current reinvestment rate, and a decrease in the prepayment rate in isolation will result in a decrease in fair value when the loan interest rate is lower than the current reinvestment rate. Prepayment rates are generally negatively correlated with interest rates.

Recovery and loss severity rates
A recovery rate is an estimation of the amount that can be collected in a loan default scenario. The recovery rate is the recovered amount divided by the loan balance due, expressed as a percentage. The inverse concept of recovery is loss severity. Loss severity rate is an estimation of the loan amount not collected when a loan defaults. The loss severity rate is the loss amount divided by the loan balance due, expressed as a percentage. Generally, an increase in the recovery rate or a decrease in the loss severity rate will increase the loan fair value, and vice versa.

Volatility rates
Volatility measures the potential variability of future prices and is often measured as the standard deviation of price movements. Volatility is an input to option pricing models used to value derivatives and issued structured notes. Volatility is used in valuing equity, interest rate, commodity and foreign exchange options. A higher volatility rate means that the underlying price or rate movements are more likely to occur. Higher volatility rates may increase or decrease an option's fair value depending on the option's terms. The determination of volatility rates is dependent on various factors, including but not limited to, the underlying's market price, the strike price and maturity.

Dividend yields
A dividend yield is the underlying equity's expected dividends expressed as an annual percentage of its price. Dividend yield is used as an input for forward equity price and option models. Higher dividend yields will decrease the forward price, and vice versa. A higher dividend yield will increase or decrease an option's value, depending on the option's terms.

Correlation rates
Correlation is the linear relationship between the movements in two different variables. Correlation is an input to the valuation of derivative contracts and issued structured notes when an instrument's payout is determined by correlated variables. When variables are positively correlated, an increase in one variable will result in an increase in the other variable. When variables are negatively correlated, an increase in one variable will result in a decrease in the other variable. The referenced variables can be within a single asset class or market (equity, interest rate, commodities, credit and foreign exchange) or between variables in different asset classes (equity to foreign exchange, or interest rate to foreign exchange). Changes in correlation will either increase or decrease a financial instrument's fair value depending on the terms of the instrument.

Interest rates
An interest rate is the percentage amount charged on a principal or notional amount. Increasing interest rates will decrease the discounted cash flow value of a financial instrument, and vice versa.

Consumer Price Index swap rates
A CPI swap rate is expressed as a percentage of an increase in the average price of a basket of consumer goods and services, such as transportation, food and medical care. An increase in the CPI swap rate will cause inflation swap payments to be larger, and vice versa.

EV/EBITDA multiples, P/E multiples, EV/Rev multiples, and liquidity discounts
Private equity valuation inputs include EV/EBITDA multiples, P/E multiples and EV/Rev multiples. These are used to calculate either enterprise value or share value of a company based on a multiple of earnings or revenue estimates. Higher multiples equate to higher fair values for all multiple types, and vice versa. A liquidity discount may be applied when few or no transactions exist to support the valuations.

Credit Enhancement
Credit enhancement is an input to the valuation of securitized transactions and is the amount of loan loss protection for a senior tranche. Credit enhancement is expressed as a percentage of the transaction sizes. An increase in credit enhancement will cause the credit spread to decrease and the tranche fair value to increase, and vice versa.

Interrelationships between unobservable inputs
Unobservable inputs, including the above discount margin, default rate, prepayment rate, and recovery and loss severity rates, may not be independent of each other. For example, the discount margin can be affected by a change in default rate, prepayment rate, or recovery and loss severity rates. Discount margins will generally decrease when default rates decline or when recovery rates increase.

Note 3 Fair value of financial instruments (continued)

Changes in fair value measurement for instruments measured on a recurring basis and categorized in Level 3

(Millions of Canadian dollars)	Fair value at beginning of period	Gains (losses) included in earnings	Gains (losses) included in OCI (1)	Purchases (issuances)	Settlement (sales) and other (2)	Transfers into Level 3	Transfers out of Level 3	Fair value at end of period	Gains (losses) included in earnings for positions still held
For the year ended October 31, 2022									
Assets									
Securities									
Trading									
Debt issued or guaranteed by:									
U.S. state, municipal and agencies	$ 25	$ –	$ 2	$ –	$ (23)	$ –	$ –	$ 4	$ –
Asset-backed securities									
Non-CDO securities	2	–	–	–	–	–	–	2	–
Corporate debt and other debt	25	(3)	–	–	(6)	9	(18)	7	–
Equities	1,530	14	100	314	(82)	1	(3)	1,874	43
	1,582	11	102	314	(111)	10	(21)	1,887	43
Investment									
Mortgage-backed securities	20	–	8	–	–	–	–	28	n.a.
Corporate debt and other debt	152	–	2	–	–	–	(3)	151	n.a.
Equities	334	–	51	11	(1)	37	(35)	397	n.a.
	506	–	61	11	(1)	37	(38)	576	n.a.
Loans	1,077	(25)	(37)	407	(466)	802	(66)	1,692	(78)
Other									
Net derivative balances (3)									
Interest rate contracts	(635)	(187)	(5)	17	64	(13)	(100)	(859)	(16)
Foreign exchange contracts	47	(103)	(2)	(22)	3	5	(60)	(132)	(90)
Other contracts	(393)	165	(34)	(245)	70	(406)	58	(785)	271
Valuation adjustments	20	–	–	25	(11)	19	–	53	–
Other assets	–	–	1	15	(1)	–	–	15	–
	$ 2,204	$ (139)	$ 86	$ 522	$ (453)	$ 454	$ (227)	$ 2,447	$ 130
Liabilities									
Deposits	$ (151)	$ 2	$ (3)	$ (120)	$ 26	$ (143)	$ 148	$ (241)	$ 19
Other									
Other liabilities	(7)	(1)	–	–	8	–	–	–	–
	$ (158)	$ 1	$ (3)	$ (120)	$ 34	$ (143)	$ 148	$ (241)	$ 19

(Millions of Canadian dollars)	Fair value at beginning of period	Gains (losses) included in earnings	Gains (losses) included in OCI (1)	Purchases (issuances)	Settlement (sales) and other (2)	Transfers into Level 3	Transfers out of Level 3	Fair value at end of period	Gains (losses) included in earnings for positions still held
For the year ended October 31, 2021									
Assets									
Securities									
Trading									
Debt issued or guaranteed by:									
U.S. state, municipal and agencies	$ 44	$ –	$ (2)	$ –	$ (17)	$ –	$ –	$ 25	$ 1
Asset-backed securities									
Non-CDO securities	2	–	–	–	–	–	–	2	–
Corporate debt and other debt	30	(2)	–	12	(5)	14	(24)	25	(1)
Equities	1,261	96	(60)	338	(125)	26	(6)	1,530	164
	1,337	94	(62)	350	(147)	40	(30)	1,582	164
Investment									
Mortgage-backed securities	27	–	(7)	–	–	–	–	20	n.a.
Corporate debt and other debt	160	–	(12)	–	4	–	–	152	n.a.
Equities	335	–	34	5	(2)	–	(38)	334	n.a.
	522	–	15	5	2	–	(38)	506	n.a.
Loans	1,070	(5)	(19)	264	(8)	73	(298)	1,077	30
Other									
Net derivative balances (3)									
Interest rate contracts	(588)	84	(1)	5	(109)	(4)	(22)	(635)	84
Foreign exchange contracts	22	14	–	38	(25)	7	(9)	47	1
Other contracts	(301)	(20)	11	(142)	102	(276)	233	(393)	(10)
Valuation adjustments	40	–	–	6	(26)	–	–	20	–
Other assets	53	(39)	(2)	–	(12)	–	–	–	–
	$ 2,155	$ 128	$ (58)	$ 526	$ (223)	$ (160)	$ (164)	$ 2,204	$ 269
Liabilities									
Deposits	$ (139)	$ (66)	$ 5	$ (191)	$ 51	$ (154)	$ 343	$ (151)	$ 6
Other									
Other liabilities	(38)	22	1	–	8	–	–	(7)	23
	$ (177)	$ (44)	$ 6	$ (191)	$ 59	$ (154)	$ 343	$ (158)	$ 29

(1) These amounts include the foreign currency translation gains or losses arising on consolidation of foreign subsidiaries relating to the Level 3 instruments, where applicable. The unrealized gains on Investment securities recognized in OCI were $50 million for the year ended October 31, 2022 (October 31, 2021 – gains of $36 million) excluding the translation gains or losses arising on consolidation.

(2) Other includes amortization of premiums or discounts recognized in net income.

(3) Net derivatives as at October 31, 2022 included derivative assets of $383 million (October 31, 2021 – $429 million) and derivative liabilities of $2,106 million (October 31, 2021 – $1,390 million).

n.a. not applicable

Transfers between fair value hierarchy levels for instruments carried at fair value on a recurring basis

Transfers between Level 1 and Level 2, and transfers into and out of Level 3 are assumed to occur at the end of the period. For an asset or a liability that transfers into Level 3 during the period, the entire change in fair value for the period is excluded from the Gains (losses) included in earnings for positions still held column of the above reconciliation, whereas for transfers out of Level 3 during the period, the entire change in fair value for the period is included in the same column of the above reconciliation.

Transfers between Level 1 and 2 are dependent on whether fair value is obtained on the basis of quoted market prices in active markets (Level 1).

During the year ended October 31, 2022, there were no significant transfers out of Level 1 to Level 2. During the year ended October 31, 2021, transfers out of Level 1 to Level 2 included Obligations related to securities sold short of $498 million.

During the year ended October 31, 2022, there were no significant transfers out of Level 2 to Level 1. During the year ended October 31, 2021, transfers out of Level 2 to Level 1 included Obligations related to securities sold short of $130 million.

Transfers between Level 2 and Level 3 are primarily due to either a change in the market observability for an input, or a change in an unobservable input's significance to a financial instrument's fair value.

During the year ended October 31, 2022, significant transfers out of Level 2 to Level 3 included:

- $777 million of Loans, due to changes in the market observability of inputs.
- $227 million of OTC equity options in Other contracts comprised of $57 million of derivative related assets and $284 million of derivative related liabilities, due to changes in the market observability of inputs and changes in the significance of unobservable inputs.
- $127 million of loan underwriting commitments in derivative related liabilities of Other contracts, due to changes in the market observability of inputs.

During the year ended October 31, 2021, significant transfers out of Level 2 to Level 3 included:

- $277 million of OTC equity options in Other contracts comprised of $17 million of derivative related assets and $294 million of derivative related liabilities, due to changes in the market observability of inputs and changes in the significance of unobservable inputs.
- $154 million of Personal deposits, due to changes in the significance of unobservable inputs.

During the year ended October 31, 2022, there were no significant transfers out of Level 3 to Level 2.

During the year ended October 31, 2021, significant transfers out of Level 3 to Level 2 included:

- $298 million of Loans, due to changes in the significance of unobservable inputs.
- $245 million of OTC equity options in Other contracts comprised of $69 million of derivative related assets and $314 million of derivative related liabilities, due to changes in the market observability of inputs and changes in the significance of unobservable inputs.
- $343 million of Personal deposits, due to changes in the significance of unobservable inputs.

Positive and negative fair value movements of Level 3 financial instruments from using reasonably possible alternative assumptions

A financial instrument is classified as Level 3 in the fair value hierarchy if one or more of its unobservable inputs may significantly affect the measurement of its fair value. In preparing the financial statements, appropriate levels for these unobservable input parameters are chosen so that they are consistent with prevailing market evidence or management judgment. Due to the unobservable nature of the prices or rates, there may be uncertainty about the valuation of these Level 3 financial instruments.

Note 3 Fair value of financial instruments (continued)

The following table summarizes the impacts to fair values of Level 3 financial instruments using reasonably possible alternative assumptions. This sensitivity disclosure is intended to illustrate the potential impact of the relative uncertainty in the fair value of Level 3 financial instruments. In reporting the sensitivities below, we offset balances in instances where: (i) the move in valuation factors cause an offsetting positive and negative fair value movement, (ii) both offsetting instruments are in Level 3, and (iii) exposures are managed and reported on a net basis. With respect to overall sensitivity, it is unlikely in practice that all reasonably possible alternative assumptions would simultaneously be realized.

	As at					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars)	Level 3 fair value	Positive fair value movement from using reasonably possible alternatives	Negative fair value movement from using reasonably possible alternatives	Level 3 fair value	Positive fair value movement from using reasonably possible alternatives	Negative fair value movement from using reasonably possible alternatives
Securities						
Trading						
Debt issued or guaranteed by:						
U.S. state, municipal and agencies	**$ 4**	**$ –**	**$ –**	$ 25	$ –	$ (1)
Asset-backed securities	**2**	**–**	**–**	2	–	–
Corporate debt and other debt	**7**	**–**	**–**	25	1	(1)
Equities	**1,874**	**27**	**(23)**	1,530	19	(16)
Investment						
Mortgage-backed securities	**28**	**4**	**(4)**	20	4	(4)
Corporate debt and other debt	**151**	**12**	**(10)**	152	14	(13)
Equities	**397**	**38**	**(39)**	334	33	(34)
Loans	**1,692**	**60**	**(62)**	1,077	23	(24)
Derivatives	**383**	**5**	**(3)**	429	7	(5)
Other assets	**15**	**–**	**–**	–	–	–
	$ 4,553	**$ 146**	**$ (141)**	$ 3,594	$ 101	$ (98)
Deposits	**$ (241)**	**$ 9**	**$ (9)**	$ (151)	$ –	$ –
Derivatives	**(2,106)**	**55**	**(57)**	(1,390)	30	(77)
Other						
Other liabilities	**–**	**–**	**–**	(7)	–	–
	$(2,347)	**$ 64**	**$ (66)**	$ (1,548)	$ 30	$ (77)

Sensitivity results

As at October 31, 2022, the effects of applying other reasonably possible alternative assumptions to the Level 3 asset positions would be an increase of $146 million and a reduction of $141 million in fair value, of which $54 million and $53 million would be recorded in Other components of equity, respectively. The effects of applying these assumptions to the Level 3 liability positions would result in a decrease of $64 million and an increase of $66 million in fair value.

Level 3 valuation inputs and approaches to developing reasonably possible alternative assumptions

The following is a summary of the unobservable inputs used in the valuation of the Level 3 instruments and our approaches to developing reasonably possible alternative assumptions used to determine sensitivity.

Financial assets or liabilities	Sensitivity methodology
Asset-backed securities, corporate debt, government debt, municipal bonds and loans	Sensitivities are determined based on adjusting, plus or minus one standard deviation, the bid-offer spreads or input prices if a sufficient number of prices is received, adjusting input parameters such as credit spreads or using high and low vendor prices as reasonably possible alternative assumptions.
Private equities, hedge fund investments and related equity derivatives	Sensitivity of direct private equity investments is determined by (i) adjusting the discount rate by 2% when the discounted cash flow method is used to determine fair value, (ii) adjusting the price multiples based on the range of multiples of comparable companies when price-multiples-based models are used, or (iii) using an alternative valuation approach. The private equity fund, hedge fund and related equity derivative NAVs are provided by the fund managers, and as a result, there are no other reasonably possible alternative assumptions for these investments.
Interest rate derivatives	Sensitivities of interest rate and cross currency swaps are derived using plus or minus one standard deviation of the inputs, and an amount representing model and parameter uncertainty, where applicable.
Equity derivatives	Sensitivity of the Level 3 position is determined by shifting the unobservable model inputs by plus or minus one standard deviation of the pricing service market data including volatility, dividends or correlations, as applicable.
Bank funding and deposits	Sensitivities of deposits are calculated by shifting the funding curve by plus or minus certain basis points.
Structured notes	Sensitivities for interest-rate-linked and equity-linked structured notes are derived by adjusting inputs by plus or minus one standard deviation, and for other deposits, by estimating a reasonable move in the funding curve by plus or minus certain basis points.

Fair value for financial instruments that are carried at amortized cost and classified using the fair value hierarchy

	As at October 31, 2022					
		Fair value may not approximate carrying value				
		Fair value measurements using				
(Millions of Canadian dollars)	Fair value approximates carrying value (1)	Level 1	Level 2	Level 3	Total	Total fair value
Interest-bearing deposits with banks	$ 23,543	$ –	$ –	$ –	$ –	$ 23,543
Amortized cost securities (2)	–	–	70,073	–	70,073	70,073
Assets purchased under reverse repurchase agreements and securities borrowed	42,224	–	10,956	–	10,956	53,180
Loans						
Retail	70,162	–	446,809	4,457	451,266	521,428
Wholesale	17,943	–	230,880	4,993	235,873	253,816
	88,105	–	677,689	9,450	687,139	775,244
Other assets	72,198	–	716	170	886	73,084
	226,070	–	759,434	9,620	769,054	995,124
Deposits						
Personal	271,414	–	108,549	433	108,982	380,396
Business and government	406,045	–	198,265	792	199,057	605,102
Bank	22,638	–	14,120	–	14,120	36,758
	700,097	–	320,934	1,225	322,159	1,022,256
Obligations related to assets sold under repurchase agreements and securities loaned	25,112	–	–	–	–	25,112
Other liabilities	77,801	–	1,554	10,805	12,359	90,160
Subordinated debentures	–	–	9,608	60	9,668	9,668
	$ 803,010	$ –	$ 332,096	$ 12,090	$ 344,186	$ 1,147,196

	As at October 31, 2021					
		Fair value may not approximate carrying value				
		Fair value measurements using				
(Millions of Canadian dollars)	Fair value approximates carrying value (1)	Level 1	Level 2	Level 3	Total	Total fair value
Interest-bearing deposits with banks	$ 22,742	$ –	$ –	$ –	$ –	$ 22,742
Amortized cost securities (2)	–	1,025	65,798	–	66,823	66,823
Assets purchased under reverse repurchase agreements and securities borrowed	31,368	–	11,524	–	11,524	42,892
Loans						
Retail	68,377	–	429,672	4,228	433,900	502,277
Wholesale	16,228	–	184,055	4,400	188,455	204,683
	84,605	–	613,727	8,628	622,355	706,960
Other assets	57,859	–	489	135	624	58,483
	196,574	1,025	691,538	8,763	701,326	897,900
Deposits						
Personal	272,675	–	70,908	457	71,365	344,040
Business and government	418,185	–	146,334	587	146,921	565,106
Bank	16,943	–	7,792	8	7,800	24,743
	707,803	–	225,034	1,052	226,086	933,889
Obligations related to assets sold under repurchase agreements and securities loaned	26,054	–	–	–	–	26,054
Other liabilities	55,495	–	1,256	7,998	9,254	64,749
Subordinated debentures	–	–	9,545	56	9,601	9,601
	$ 789,352	$ –	$ 235,835	$ 9,106	$ 244,941	$ 1,034,293

(1) Certain financial instruments have not been assigned to a level as the carrying amount approximates their fair values.

(2) Included in Securities – Investment, net of applicable allowance on the Consolidated Balance Sheets.

Fair values of financial assets and liabilities carried at amortized cost and disclosed in the table above are determined using the following valuation techniques and inputs.

Note 3 Fair value of financial instruments (continued)

Amortized cost securities
Fair values of government bonds, corporate bonds, and ABS are based on quoted prices. Fair values of certain Non-OECD government bonds are based on vendor prices or the discounted cash flow method with yield curves of other countries' government bonds as inputs. For ABS, where market prices are not available, the fair value is determined using the discounted cash flow method. The inputs to the valuation model generally include market interest rates, spreads and yields derived from comparable securities, prepayment, and LGD.

Assets purchased under reverse repurchase agreements and securities borrowed, and Obligations related to assets sold under repurchase agreements and securities loaned
Valuation methods used for the long-term instruments are described in the Fair value of assets and liabilities measured on a recurring basis and classified using the fair value hierarchy section of this note. The carrying values of short-term instruments generally approximate their fair values.

Loans – Retail
Retail loans include residential mortgages, personal and small business loans and credit cards. For residential mortgages, and personal and small business loans, we segregate the portfolio based on certain attributes such as product type, contractual interest rate, term to maturity and credit scores, if applicable. Fair values of these loans are determined by the discounted cash flow method using applicable inputs such as prevailing interest rates, contractual and posted client rates, client discounts, credit spreads, prepayment rates and loan-to-value (LTV) ratios. Fair values of credit card receivables are also calculated based on a discounted cash flow method with portfolio yields, write-offs and monthly payment rates as inputs. The carrying values of short-term and variable rate loans generally approximate their fair values.

Loans – Wholesale
Where market prices are available, wholesale loans are valued based on market prices. Otherwise, fair value is determined by the discounted cash flow method using the following inputs: market interest rates and market based spreads of assets with similar credit ratings and terms to maturity, LGD, expected default frequency implied from credit default swap prices, if available, and relevant pricing information such as contractual rate, origination and maturity dates, redemption price, coupon payment frequency and date convention.

Deposits
Deposits are comprised of demand, notice, and term deposits which include senior deposit notes we have issued to provide us with long-term funding. Fair values of term deposits are determined by one of several valuation techniques: (i) for term deposits and similar instruments, we segregate the portfolio based on term to maturity. Fair values of these instruments are determined by the discounted cash flow method using inputs such as client rates for new sales of the corresponding terms; and (ii) for senior deposit notes, we use actual traded prices, vendor prices or the discounted cash flow method using a market interest rate curve and our funding spreads as inputs. The carrying values of demand, notice, and short-term term deposits generally approximate their fair values.

Other assets and Other liabilities
Other assets and Other liabilities include receivables and payables relating to certain commodities. Fair values of the commodity receivables and payables are calculated by the discounted cash flow method using applicable inputs such as market interest rates, counterparties' credit spreads, our funding spreads, commodity forward prices and spot prices.

Subordinated debentures
Fair values of Subordinated debentures are based on market prices, dealer quotes or vendor prices when available. Where prices cannot be observed, fair value is determined using the discounted cash flow method, with applicable inputs such as market interest rates and credit spreads.

Note 4 Securities

Carrying value of securities

(Millions of Canadian dollars)	Within 3 months	3 months to 1 year	1 year to 5 years	5 years to 10 years	Over 10 years	With no specific maturity	Total
	As at October 31, 2022						
	Term to maturity (1)						
Trading (2)							
Debt issued or guaranteed by:							
Canadian government	$ 2,255	$ 14,181	$ 6,907	$ 2,706	$ 6,011	$ –	$ 32,060
U.S. federal, state, municipal and agencies	7,151	10,107	7,043	4,507	8,020	–	36,828
Other OECD government	1,343	233	606	241	2,354	–	4,777
Mortgage-backed securities	–	–	–	–	2	–	2
Asset-backed securities	779	49	67	207	208	–	1,310
Corporate debt and other debt							
Bankers' acceptances	252	3	–	–	–	–	255
Other (3)	3,055	1,837	4,813	3,037	8,172	–	20,914
Equities						52,059	52,059
	14,835	26,410	19,436	10,698	24,767	52,059	148,205
Fair value through other comprehensive income (2)							
Debt issued or guaranteed by:							
Canadian government							
Federal							
Amortized cost	780	1,010	1,024	745	522	–	4,081
Fair value	778	1,009	1,012	635	347	–	3,781
Yield (4)	2.3%	2.3%	2.8%	1.6%	3.1%	–	2.4%
Provincial and municipal							
Amortized cost	237	215	616	56	1,561	–	2,685
Fair value	237	216	616	56	999	–	2,124
Yield (4)	2.0%	2.7%	2.0%	3.8%	4.1%	–	3.0%
U.S. federal, state, municipal and agencies							
Amortized cost	802	2,613	13,586	9,104	19,929	–	46,034
Fair value	802	2,615	13,554	9,061	18,326	–	44,358
Yield (4)	4.9%	0.4%	1.9%	3.4%	3.0%	–	2.6%
Other OECD government							
Amortized cost	1,105	642	3,406	1	–	–	5,154
Fair value	1,105	642	3,396	1	–	–	5,144
Yield (4)	2.4%	1.2%	1.7%	4.4%	–	–	1.8%
Mortgage-backed securities							
Amortized cost	–	–	–	41	2,944	–	2,985
Fair value	–	–	–	37	2,851	–	2,888
Yield (4)	–	–	–	4.5%	4.7%	–	4.7%
Asset-backed securities							
Amortized cost	–	–	46	6,331	1,911	–	8,288
Fair value	–	–	46	6,172	1,830	–	8,048
Yield (4)	–	–	4.6%	5.3%	5.4%	–	5.3%
Corporate debt and other debt							
Amortized cost	5,922	4,793	12,420	2,666	51	–	25,852
Fair value	5,919	4,792	12,307	2,656	46	–	25,720
Yield (4)	3.2%	2.8%	2.6%	3.1%	5.1%	–	2.8%
Equities							
Cost						551	551
Fair value (5)						828	828
Amortized cost	8,846	9,273	31,098	18,944	26,918	551	95,630
Fair value	8,841	9,274	30,931	18,618	24,399	828	92,891
Amortized cost (2)							
Debt issued or guaranteed by:							
Canadian government	929	1,734	16,655	6,101	–	–	25,419
Yield (4)	2.4%	2.8%	2.0%	2.3%	–	–	2.1%
U.S. federal, state, municipal and agencies	161	784	3,885	3,784	25,518	–	34,132
Yield (4)	4.4%	3.0%	1.7%	2.3%	2.4%	–	2.3%
Other OECD government	235	1,574	3,645	64	–	–	5,518
Yield (4)	1.3%	1.3%	1.9%	1.3%	–	–	1.7%
Asset-backed securities	–	–	573	135	3	–	711
Yield (4)	–	–	3.0%	3.5%	1.5%	–	3.1%
Corporate debt and other debt	574	2,434	7,574	741	24	–	11,347
Yield (4)	0.8%	1.7%	2.6%	2.4%	4.9%	–	2.0%
Amortized cost, net of allowance	1,899	6,526	32,332	10,825	25,545	–	77,127
Fair value	1,899	6,455	30,579	9,433	21,707	–	70,073
Total carrying value of securities	$ 25,575	$ 42,210	$ 82,699	$ 40,141	$ 74,711	$ 52,887	$ 318,223

Note 4 Securities (continued)

(Millions of Canadian dollars)	As at October 31, 2021 Term to maturity (1) Within 3 months	3 months to 1 year	1 year to 5 years	5 years to 10 years	Over 10 years	With no specific maturity	Total
Trading (2)							
Debt issued or guaranteed by:							
Canadian government	$ 1,244	$ 4,252	$ 6,187	$ 3,339	$ 7,403	$ –	$ 22,425
U.S. federal, state, municipal and agencies	2,381	1,616	6,203	4,092	8,686	–	22,978
Other OECD government	2,049	2,073	1,231	294	2,812	–	8,459
Mortgage-backed securities	–	–	–	–	4	–	4
Asset-backed securities	288	27	275	116	187	–	893
Corporate debt and other debt							
Bankers' acceptances	316	135	–	–	–	–	451
Other (3)	2,317	2,526	5,433	3,716	8,667	–	22,659
Equities						61,371	61,371
	8,595	10,629	19,329	11,557	27,759	61,371	139,240
Fair value through other comprehensive income (2)							
Debt issued or guaranteed by:							
Canadian government							
Federal							
Amortized cost	161	1,180	1,382	592	526	–	3,841
Fair value	161	1,178	1,375	544	445	–	3,703
Yield (4)	0.4%	0.7%	1.8%	0.9%	2.4%	–	1.3%
Provincial and municipal							
Amortized cost	3	283	1,326	158	1,558	–	3,328
Fair value	3	283	1,322	158	1,366	–	3,132
Yield (4)	4.2%	2.6%	2.4%	1.7%	2.9%	–	2.6%
U.S. federal, state, municipal and agencies							
Amortized cost	1,131	5,010	7,960	2,380	18,197	–	34,678
Fair value	1,132	5,013	7,960	2,446	18,276	–	34,827
Yield (4)	–	0.9%	0.4%	2.6%	1.3%	–	1.1%
Other OECD government							
Amortized cost	176	1,274	4,498	1	–	–	5,949
Fair value	176	1,274	4,505	1	–	–	5,956
Yield (4)	1.7%	1.0%	1.3%	3.9%	–	–	1.2%
Mortgage-backed securities							
Amortized cost	–	–	56	55	2,646	–	2,757
Fair value	–	–	56	55	2,636	–	2,747
Yield (4)	–	–	1.2%	1.3%	1.2%	–	1.2%
Asset-backed securities							
Amortized cost	–	–	–	4,719	2,935	–	7,654
Fair value	–	–	–	4,719	2,941	–	7,660
Yield (4)	–	–	–	1.2%	1.3%	–	1.3%
Corporate debt and other debt							
Amortized cost	5,965	2,597	9,676	1,451	42	–	19,731
Fair value	5,965	2,599	9,699	1,463	51	–	19,777
Yield (4)	0.9%	1.2%	1.5%	0.8%	3.6%	–	1.2%
Equities							
Cost						242	242
Fair value (5)						533	533
Amortized cost	7,436	10,344	24,898	9,356	25,904	242	78,180
Fair value	7,437	10,347	24,917	9,386	25,715	533	78,335
Amortized cost (2)							
Debt issued or guaranteed by:							
Canadian government	453	2,979	17,589	3,601	194	–	24,816
Yield (4)	1.1%	1.5%	1.5%	2.0%	1.7%	–	1.5%
U.S. federal, state, municipal and agencies	1,093	274	3,718	2,767	19,559	–	27,411
Yield (4)	–	1.0%	1.0%	2.1%	1.3%	–	1.3%
Other OECD government	1,914	1,212	2,790	58	–	–	5,974
Yield (4)	–	1.3%	0.8%	1.1%	–	–	–
Asset-backed securities	–	–	320	336	7	–	663
Yield (4)	–	–	0.5%	1.7%	1.4%	–	1.1%
Corporate debt and other debt	1,133	2,072	4,424	633	23	–	8,285
Yield (4)	1.0%	1.2%	1.6%	2.0%	4.7%	–	1.4%
Amortized cost, net of allowance	4,593	6,537	28,841	7,395	19,783	–	67,149
Fair value	4,597	6,567	28,701	7,311	19,647	–	66,823
Total carrying value of securities	$ 20,625	$ 27,513	$ 73,087	$ 28,338	$ 73,257	$ 61,904	$ 284,724

(1) Actual maturities may differ from contractual maturities shown above as borrowers may have the right to extend or prepay obligations with or without penalties.

(2) Trading securities and FVOCI securities are recorded at fair value. Amortized cost securities, included in Investment securities, are recorded at amortized cost and presented net of allowance for credit losses.

(3) Primarily composed of corporate debt, supra-national debt, and commercial paper.

(4) The weighted average yield is derived using the contractual interest rate and the carrying value at the end of the year for the respective securities.

(5) Certain equity securities that are not held-for-trading purposes are designated as FVOCI.

Unrealized gains and losses on securities at FVOCI (1), (2)

(Millions of Canadian dollars)	As at October 31, 2022 Cost/ Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value	October 31, 2021 Cost/ Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Debt issued or guaranteed by:								
Canadian government								
Federal (3)	$ 4,081	$ 1	$ (301)	$ 3,781	$ 3,841	$ 1	$ (139)	$ 3,703
Provincial and municipal	2,685	6	(567)	2,124	3,328	3	(199)	3,132
U.S. federal, state, municipal and agencies (3)	46,034	343	(2,019)	44,358	34,678	353	(204)	34,827
Other OECD government	5,154	7	(17)	5,144	5,949	8	(1)	5,956
Mortgage-backed securities (3)	2,985	1	(98)	2,888	2,757	2	(12)	2,747
Asset-backed securities								
CDO	7,741	3	(220)	7,524	7,074	1	(1)	7,074
Non-CDO securities	547	–	(23)	524	580	6	–	586
Corporate debt and other debt	25,852	51	(183)	25,720	19,731	57	(11)	19,777
Equities	551	284	(7)	828	242	292	(1)	533
	$ 95,630	$ 696	$ (3,435)	$ 92,891	$ 78,180	$ 723	$ (568)	$ 78,335

(1) Excludes $77,127 million of held-to-collect securities as at October 31, 2022 that are carried at amortized cost, net of allowance for credit losses (October 31, 2021 – $7,149 million).

(2) Gross unrealized gains and losses includes $(9) million of allowance for credit losses on debt securities at FVOCI as at October 31, 2022 (October 31, 2021 – $(9) million) recognized in income and Other components of equity.

(3) The majority of the MBS are residential. Cost/Amortized cost, Gross unrealized gains, Gross unrealized losses and Fair value related to commercial MBS are $2,846 million, $1 million, $92 million and $2,755 million, respectively as at October 31, 2022 (October 31, 2021 – $2,603 million, $1 million, $12 million and $2,592 million, respectively).

Allowance for credit losses on investment securities

The following tables reconcile the opening and closing allowance for debt securities at FVOCI and amortized cost by stage. Reconciling items include the following:

- Model changes, which generally comprise the impact of significant changes to the quantitative models used to estimate expected credit losses and any staging impacts that may arise.
- Transfers between stages, which are presumed to occur before any corresponding remeasurement of the allowance.
- Purchases, which reflect the allowance related to assets newly recognized during the period, including those assets that were derecognized following a modification of terms.
- Sales and maturities, which reflect the allowance related to assets derecognized during the period without a credit loss being incurred, including those assets that were derecognized following a modification of terms.
- Changes in risk, parameters and exposures, which comprise the impact of changes in model inputs or assumptions, including changes in forward-looking macroeconomic conditions; partial repayments; changes in the measurement following a transfer between stages; and unwinding of the time value discount due to the passage of time.

Allowance for credit losses – securities at FVOCI (1)

(Millions of Canadian dollars)	For the year ended October 31, 2022 Performing Stage 1	Performing Stage 2	Impaired Stage 3 (2)	Total	October 31, 2021 Performing Stage 1	Performing Stage 2	Impaired Stage 3 (2)	Total
Balance at beginning of period	$ 2	$ 1	$ (12)	$ (9)	$ 12	$ –	$ (4)	$ 8
Provision for credit losses								
Model changes	–	–	–	–	(4)	–	–	(4)
Transfers to stage 1	1	(1)	–	–	1	(1)	–	–
Transfers to stage 2	–	–	–	–	–	–	–	–
Transfers to stage 3	–	–	–	–	–	–	–	–
Purchases	3	–	–	3	8	–	–	8
Sales and maturities	(1)	–	–	(1)	(10)	(1)	–	(11)
Changes in risk, parameters and exposures	(2)	1	(10)	(11)	(4)	3	(9)	(10)
Exchange rate and other	–	–	(1)	(1)	(1)	–	1	–
Balance at end of period	$ 3	$ 1	$ (23)	$ (19)	$ 2	$ 1	$ (12)	$ (9)

(1) Expected credit losses on debt securities at FVOCI are not separately recognized on the Consolidated Balance Sheets as the related securities are recorded at fair value. The cumulative amount of credit losses recognized in income is presented in Other components of equity.

(2) Reflects changes in the allowance for purchased credit impaired securities.

Note 4 Securities (continued)

Allowance for credit losses – securities at amortized cost

	For the year ended							
	October 31, 2022				October 31, 2021			
	Performing		Impaired		Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 5	$ 18	$ –	$ 23	$ 10	$ 19	$ –	$ 29
Provision for credit losses								
Model changes	–	–	–	–	(4)	–	–	(4)
Transfers to stage 1	–	–	–	–	–	–	–	–
Transfers to stage 2	–	–	–	–	–	–	–	–
Transfers to stage 3	–	–	–	–	–	–	–	–
Purchases	11	–	–	11	9	–	–	9
Sales and maturities	(1)	–	–	(1)	(1)	–	–	(1)
Changes in risk, parameters and exposures	(7)	(6)	–	(13)	(9)	1	–	(8)
Exchange rate and other	–	2	–	2	–	(2)	–	(2)
Balance at end of period	$ 8	$ 14	$ –	$ 22	$ 5	$ 18	$ –	$ 23

Credit risk exposure by internal risk rating

The following table presents the fair value of debt securities at FVOCI and gross carrying amount of securities at amortized cost. Risk ratings are based on internal ratings used in the measurement of expected credit losses, as at the reporting date, as outlined in the internal ratings maps in the Credit risk section of Management's Discussion and Analysis.

	As at							
	October 31, 2022				October 31, 2021			
	Performing		Impaired		Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3 (1)	Total	Stage 1	Stage 2	Stage 3 (1)	Total
Investment securities								
Securities at FVOCI								
Investment grade	$ 91,177	$ 56	$ –	$ 91,233	$ 77,147	$ 82	$ –	$ 77,229
Non-investment grade	680	–	–	680	423	–	–	423
Impaired	–	–	150	150	–	–	150	150
	91,857	56	150	92,063	77,570	82	150	77,802
Items not subject to impairment (2)				828				533
				$ 92,891				$ 78,335
Securities at amortized cost								
Investment grade	$ 76,035	$ –	$ –	$ 76,035	$ 66,033	$ –	$ –	$ 66,033
Non-investment grade	898	216	–	1,114	928	211	–	1,139
Impaired	–	–	–	–	–	–	–	–
	76,933	216	–	77,149	66,961	211	–	67,172
Allowance for credit losses	8	14	–	22	5	18	–	23
Amortized cost	$ 76,925	$ 202	$ –	$ 77,127	$ 66,956	$ 193	$ –	$ 67,149

(1) Reflects $150 million of purchased credit impaired securities (October 31, 2021 – $150 million).

(2) Investment securities at FVOCI not subject to impairment represent equity securities designated as FVOCI.

Note 5 Loans and allowance for credit losses

Loans by geography and portfolio net of allowance

(Millions of Canadian dollars)	As at October 31, 2022 Canada	United States	Other International	Total	Allowance for loan losses (1)	Total net of allowance
Retail (2)						
Residential mortgages	$ 383,797	$ 31,956	$ 3,043	$418,796	$ (432)	$ 418,364
Personal	79,422	14,888	3,399	97,709	(856)	96,853
Credit cards (3)	19,778	558	241	20,577	(849)	19,728
Small business (4)	12,669	–	–	12,669	(181)	12,488
Wholesale (2), (5)	108,916	114,795	50,256	273,967	(1,435)	272,532
Total loans	$ 604,582	$ 162,197	$ 56,939	$823,718	$ (3,753)	$ 819,965
Undrawn loan commitments – Retail	258,115	4,630	2,212	264,957	(243)	
Undrawn loan commitments – Wholesale	118,928	225,113	81,194	425,235	(135)	

(Millions of Canadian dollars)	As at October 31, 2021 Canada	United States	Other International	Total	Allowance for loan losses (1)	Total net of allowance
Retail (2)						
Residential mortgages	$ 354,169	$ 23,423	$ 2,740	$380,332	$ (416)	$ 379,916
Personal	78,232	11,794	3,415	93,441	(973)	92,468
Credit cards (3)	17,235	384	203	17,822	(852)	16,970
Small business (4)	12,003	–	–	12,003	(168)	11,835
Wholesale (2), (5)	88,083	86,028	43,955	218,066	(1,680)	216,386
Total loans	$ 549,722	$ 121,629	$ 50,313	$721,664	$ (4,089)	$ 717,575
Undrawn loan commitments – Retail	240,242	3,713	1,989	245,944	(136)	
Undrawn loan commitments – Wholesale	107,070	189,177	75,331	371,578	(105)	

(1) Excludes allowance for loans measured at FVOCI of $ million (October 31, 2021 – $4 million).
(2) Geographic information is based on residence of the borrower.
(3) The credit cards business is managed as a single portfolio and includes both consumer and business cards.
(4) Includes small business exposure managed on a pooled basis.
(5) Includes small business exposure managed on an individual client basis.

Loans maturity and rate sensitivity

(Millions of Canadian dollars)	As at October 31, 2022 Maturity term (1) Under 1 year (2)	1 to 5 years	Over 5 years	Total	Rate sensitivity Floating	Fixed Rate	Non-rate-sensitive	Total
Retail	$ 277,302	$ 226,793	$ 45,656	$ 549,751	$ 199,414	$ 342,087	$ 8,250	$ 549,751
Wholesale	226,813	35,802	11,352	273,967	46,660	225,123	2,184	273,967
Total loans	$ 504,115	$ 262,595	$ 57,008	$ 823,718	$ 246,074	$ 567,210	$ 10,434	$ 823,718
Allowance for loan losses				(3,753)				(3,753)
Total loans net of allowance for loan losses				$ 819,965				$ 819,965

(Millions of Canadian dollars)	As at October 31, 2021 Maturity term (1) Under 1 year (2)	1 to 5 years	Over 5 years	Total	Rate sensitivity Floating	Fixed Rate	Non-rate-sensitive	Total
Retail	$ 249,363	$ 222,408	$ 31,827	$ 503,598	$ 166,910	$ 329,185	$ 7,503	$ 503,598
Wholesale	174,345	33,882	9,839	218,066	36,143	179,588	2,335	218,066
Total loans	$ 423,708	$ 256,290	$ 41,666	$ 721,664	$ 203,053	$ 508,773	$ 9,838	$ 721,664
Allowance for loan losses				(4,089)				(4,089)
Total loans net of allowance for loan losses				$ 717,575				$ 717,575

(1) Generally, based on the earlier of contractual repricing or maturity date.
(2) Includes variable rate loans that can be repriced at the clients' discretion without penalty.

Note 5 Loans and allowance for credit losses (continued)

Allowance for credit losses

(Millions of Canadian dollars)	For the year ended October 31, 2022 Balance at beginning of period	Provision for credit losses	Net write-offs (1)	Exchange rate and other	Balance at end of period	For the year ended October 31, 2021 Balance at beginning of period	Provision for credit losses	Net write-offs (1)	Exchange rate and other	Balance at end of period
Retail										
Residential mortgages	$ 416	$ 27	$ (24)	$ 13	$ 432	$ 518	$ (43)	$ (27)	$ (32)	$ 416
Personal	1,079	211	(248)	1	1,043	1,309	23	(247)	(6)	1,079
Credit cards	875	348	(332)	2	893	1,246	(72)	(297)	(2)	875
Small business	177	31	(23)	9	194	140	12	(23)	48	177
Wholesale	1,797	(90)	(136)	3	1,574	2,795	(560)	(200)	(238)	1,797
Customers' liability under acceptances	75	(30)	–	–	45	107	(32)	–	–	75
	$ 4,419	$ 497	$ (763)	$ 28	$4,181	$ 6,115	$ (672)	$ (794)	$ (230)	$4,419
Presented as:										
Allowance for loan losses	$ 4,089				$3,753	$ 5,639				$4,089
Other liabilities – Provisions	241				378	363				241
Customers' liability under acceptances	75				45	107				75
Other components of equity	14				5	6				14

(1) Loans written-off are generally subject to continued collection efforts for a period of time following write-off. The contractual amount outstanding on loans written-off during the year ended October 31, 2022 that are no longer subject to enforcement activity was $53 million (October 31, 2021 – $93 million).

The following table reconciles the opening and closing allowance for each major product of loans and commitments as determined by our modelled, scenario-weighted allowance and the application of expert credit judgment as applicable. Reconciling items include the following:

- Model changes, which generally comprise the impact of significant changes to the quantitative models used to estimate expected credit losses and any staging impacts that may arise.
- Transfers between stages, which are presumed to occur before any corresponding remeasurements of the allowance.
- Originations, which reflect the allowance related to assets newly recognized during the period, including those assets that were derecognized following a modification of terms.
- Maturities, which reflect the allowance related to assets derecognized during the period without a credit loss being incurred, including those assets that were derecognized following a modification of terms.
- Changes in risk, parameters and exposures, which comprise the impact of changes in model inputs or assumptions, including changes in forward-looking macroeconomic conditions; partial repayments and additional draws on existing facilities; changes in the measurement following a transfer between stages; and unwinding of the time value discount due to the passage of time in Stage 1 and Stage 2.

Table of Contents

Allowance for credit losses – Retail and wholesale loans

	For the year ended							
	October 31, 2022				October 31, 2021			
	Performing		Impaired		Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total	Stage 1	Stage 2	Stage 3	Total
Residential mortgages								
Balance at beginning of period	$ 186	$ 92	$ 138	$ 416	$ 206	$ 160	$ 152	$ 518
Provision for credit losses								
Model changes	(21)	10	–	(11)	(6)	(5)	–	(11)
Transfers to stage 1	113	(98)	(15)	–	205	(182)	(23)	–
Transfers to stage 2	(14)	23	(9)	–	(14)	18	(4)	–
Transfers to stage 3	(2)	(25)	27	–	(2)	(44)	46	–
Originations	159	–	–	159	113	–	–	113
Maturities	(23)	(9)	–	(32)	(30)	(24)	–	(54)
Changes in risk, parameters and exposures	(167)	68	10	(89)	(284)	178	15	(91)
Write-offs	–	–	(38)	(38)	–	–	(37)	(37)
Recoveries	–	–	14	14	–	–	10	10
Exchange rate and other	4	4	5	13	(2)	(9)	(21)	(32)
Balance at end of period	$ 235	$ 65	$ 132	$ 432	$ 186	$ 92	$ 138	$ 416
Personal								
Balance at beginning of period	$ 422	$ 569	$ 88	$ 1,079	$ 480	$ 733	$ 96	$ 1,309
Provision for credit losses								
Model changes	(3)	–	–	(3)	(1)	–	–	(1)
Transfers to stage 1	609	(607)	(2)	–	710	(706)	(4)	–
Transfers to stage 2	(120)	121	(1)	–	(97)	97	–	–
Transfers to stage 3	(2)	(47)	49	–	(3)	(58)	61	–
Originations	106	–	–	106	128	–	–	128
Maturities	(70)	(99)	–	(169)	(96)	(130)	–	(226)
Changes in risk, parameters and exposures	(660)	724	213	277	(697)	633	186	122
Write-offs	–	–	(374)	(374)	–	–	(387)	(387)
Recoveries	–	–	126	126	–	–	140	140
Exchange rate and other	3	–	(2)	1	(2)	–	(4)	(6)
Balance at end of period	$ 285	$ 661	$ 97	$ 1,043	$ 422	$ 569	$ 88	$ 1,079
Credit cards								
Balance at beginning of period	$ 233	$ 642	$ –	$ 875	$ 364	$ 882	$ –	$ 1,246
Provision for credit losses								
Model changes	(2)	–	–	(2)	–	–	–	–
Transfers to stage 1	495	(495)	–	–	723	(723)	–	–
Transfers to stage 2	(95)	95	–	–	(105)	105	–	–
Transfers to stage 3	(2)	(325)	327	–	(4)	(309)	313	–
Originations	10	–	–	10	6	–	–	6
Maturities	(9)	(29)	–	(34)	(7)	(31)	–	(38)
Changes in risk, parameters and exposures	(458)	826	6	374	(742)	719	(17)	(40)
Write-offs	–	–	(503)	(503)	–	–	(460)	(460)
Recoveries	–	–	171	171	–	–	163	163
Exchange rate and other	1	2	(1)	2	(2)	(1)	1	(2)
Balance at end of period	$ 177	$ 716	$ –	$ 893	$ 233	$ 642	$ –	$ 875
Small business								
Balance at beginning of period	$ 88	$ 55	$ 34	$ 177	$ 78	$ 29	$ 33	$ 140
Provision for credit losses								
Model changes	–	–	–	–	3	1	–	4
Transfers to stage 1	27	(27)	–	–	57	(57)	–	–
Transfers to stage 2	(17)	17	–	–	(11)	11	–	–
Transfers to stage 3	(1)	(4)	5	–	(1)	(2)	3	–
Originations	32	–	–	32	36	–	–	36
Maturities	(22)	(24)	–	(46)	(21)	(22)	–	(43)
Changes in risk, parameters and exposures	(43)	50	38	45	(77)	64	28	15
Write-offs	–	–	(32)	(32)	–	–	(32)	(32)
Recoveries	–	–	9	9	–	–	9	9
Exchange rate and other	9	6	(6)	9	24	31	(7)	48
Balance at end of period	$ 73	$ 73	$ 48	$ 194	$ 88	$ 55	$ 34	$ 177
Wholesale								
Balance at beginning of period	$ 566	$ 794	$ 437	$ 1,797	$ 995	$ 1,132	$ 668	$ 2,795
Provision for credit losses								
Model changes	(14)	(3)	–	(17)	1	24	–	25
Transfers to stage 1	415	(411)	(4)	–	581	(576)	(5)	–
Transfers to stage 2	(78)	80	(2)	–	(132)	161	(29)	–
Transfers to stage 3	(3)	(62)	65	–	(4)	(60)	64	–
Originations	641	–	–	641	601	–	–	601
Maturities	(439)	(345)	–	(784)	(488)	(500)	–	(988)
Changes in risk, parameters and exposures	(504)	503	71	70	(931)	689	44	(198)
Write-offs	–	–	(202)	(202)	–	–	(253)	(253)
Recoveries	–	–	66	66	–	–	53	53
Exchange rate and other	13	29	(39)	3	(57)	(76)	(105)	(238)
Balance at end of period	$ 597	$ 585	$ 392	$ 1,574	$ 566	$ 794	$ 437	$ 1,797

Note 5 Loans and allowance for credit losses (continued)

Key inputs and assumptions
The measurement of expected credit losses is a complex calculation that involves a large number of interrelated inputs and assumptions and the allowance is not sensitive to any one single factor alone. The key drivers of changes in expected credit losses include the following:

- Changes in the credit quality of the borrower or instrument, primarily reflected in changes in internal risk ratings;
- Changes in forward-looking macroeconomic conditions, specifically the macroeconomic variables to which our models are calibrated, which are those most closely correlated with credit losses in the relevant portfolio;
- Changes in scenario design and the weights assigned to each scenario; and
- Transfers between stages, which can be triggered by changes to any of the above inputs.

To reflect relevant risk factors not captured in our modelled results, we applied expert credit judgment in determining significant increases in credit risk since origination as well as in the measurement of our weighted allowance for credit losses due to uncertainty related to the pace and level of deterioration in economic forecasts.

Internal risk ratings
Internal risk ratings are assigned according to the risk management framework outlined under the headings Wholesale credit risk and Retail credit risk of the Credit risk section of Management's Discussion and Analysis. Changes in internal risk ratings are primarily reflected in the PD parameters, which are estimated based on our historical loss experience at the relevant risk segment or risk rating level, adjusted for forward-looking information.

Scenario design and weightings
Our estimation of expected credit losses in Stage 1 and Stage 2 considers five distinct future macroeconomic scenarios. Scenarios are designed to capture a wide range of possible outcomes and are weighted according to our expectation of the relative likelihood of the range of outcomes that each scenario represents at the reporting date. We weight each scenario to take into account historical frequency, current trends, and forward-looking conditions which will change over time. The base case scenario is based on forecasts of the expected rate, value or yield for each relevant macroeconomic variable. The upside and downside scenarios are set by adjusting our base projections to construct reasonably possible scenarios and weightings that are more optimistic and pessimistic, respectively, than the base case. Two additional downside scenarios capture the non-linear nature of potential credit losses across our portfolios.

The impact of each of our five scenarios varies across our portfolios given the portfolios have different sensitivities to movements in each macroeconomic variable. We reassessed our scenario weights to increase weight to the downside scenarios relative to October 31, 2021 in order to reflect the uncertainty and downside risk of deeper recessions than contemplated in our base scenario.

The impact of weighting these multiple scenarios increased our ACL on performing loans, relative to our base scenario, by $738 million at October 31, 2022 (October 31, 2021 – $726 million).

Forward looking macroeconomic variables
The PD, LGD and EAD inputs used to estimate Stage 1 and Stage 2 credit loss allowances are modelled based on the macroeconomic variables (or changes in macroeconomic variables) that are most closely correlated with credit losses in the relevant portfolio. Each macroeconomic scenario used in our expected credit loss calculation includes a projection of all relevant macroeconomic variables used in our models for a five year horizon, reverting to long-run averages generally within the 2 to 5 year period. Depending on their usage in the models, macroeconomic variables are projected at a country, province/state or more granular level. These include one or more of the variables described below, which differ by portfolio and region.

Our allowance for credit losses reflects our economic outlook as at October 31, 2022. Subsequent changes to this forecast and related estimates will be reflected in our allowance for credit losses in future periods.

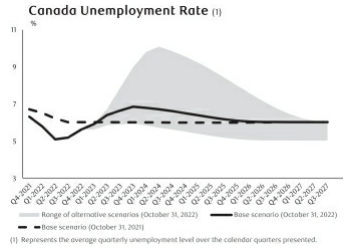
Our base scenario reflects rising unemployment rates, high inflation, production capacity limits, supply chain pressures, and increased expectations for central banks to continue increasing interest rates which results in moderate recessions expected in Canada and the U.S. in calendar 2023. Our base scenario also reflects declining housing prices in Canada.

Downside scenarios, including two additional and more severe downside scenarios designed for the energy and real estate sectors, reflect the possibility of a more severe macroeconomic shock beginning in calendar Q1 2023 relative to our base scenario. Conditions are expected to deteriorate from calendar Q4 2022 levels for up to 18 months, followed by a recovery for the remainder of the period. These scenarios assume monetary policy responses that return the economy to a long-run, sustainable growth rate within the forecast period. The possibility of a deeper recession and a more prolonged recovery as compared to our base scenario, including further monetary policy responses to elevated inflation rates which may increase credit risk, is reflected in our general downside scenario.

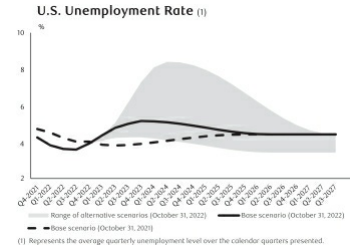
The upside scenario reflects slightly stronger economic growth than the base scenario, without prompting a further offsetting monetary policy response as compared to our base scenario, followed by a return to a long-run sustainable growth rate within the forecast period.

The following provides additional detail about our calendar quarter forecasts for certain key macroeconomic variables used in the models to estimate ACL:

- ***Unemployment*** – In our base forecast, calendar Q4 2022 unemployment rates are expected to rise to 5.6% in Canada and 3.9% in the U.S., peaking by Q4 2023 at 6.8% in Canada and 5.1% in the U.S., and reverting to the long run equilibrium towards the latter end of the forecast horizon.

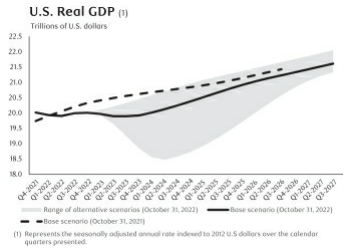


(1) Represents the average quarterly unemployment level over the calendar quarters presented.



(1) Represents the average quarterly unemployment level over the calendar quarters presented.

- ***Gross Domestic Product (GDP)*** – In our base forecast, we expect Canadian and U.S GDP growth to slow and for both regions to experience moderate recessions during the first half of calendar 2023. GDP in calendar Q4 2023 is expected to be 0.2% below Q4 2022 levels in Canada, and 0.4% below such levels in the U.S.



(1) Represents the seasonally adjusted annual rate indexed to 2012 U.S dollars over the calendar quarters presented.

- ***Oil price (West Texas Intermediate in US$)*** – In our base forecast, we expect oil prices to average $88 per barrel over the next 12 months from calendar Q4 2022 and $72 per barrel in the following 2 to 5 years. The range of average prices in our alternative downside and upside scenarios is $29 to $114 per barrel for the next 12 months and $42 to $77 per barrel for the following 2 to 5 years. As at October 31, 2021, our base forecast included an average price of $71 per barrel for the next 12 months and $56 per barrel for the following 2 to 5 years.

- ***Canadian housing price* index** – In our base forecast, we expect housing prices to decrease by (1.0)% over the next 12 months from calendar Q4 2022, with a compound annual growth rate of 5.2% for the following 2 to 5 years. The range of annual housing price growth (contraction) in our alternative real estate downside and upside scenarios is (30.0)% to 10.9% over the next 12 months and 4.2% to 9.5% for the following 2 to 5 years. As at October 31, 2021 our base forecast included housing price growth of 0.1% from calendar Q4 2021 for the next 12 months and 4.1% for the following 2 to 5 years.

The primary variables driving credit losses in our retail portfolios are Canadian unemployment rates, Canadian housing price index and Canadian GDP. The Canadian overnight interest rate also impacts our retail portfolios. Our wholesale portfolios are affected by all of the variables discussed above; however, the specific variables differ by sector. Other variables also impact our wholesale portfolios including, but not limited to, Canadian and U.S. 10 year BBB corporate bond credit spreads, Canadian and U.S. 10 year government bond yields, U.S. 10 year BBB corporate bond yield, Canadian consumer confidence index, Canadian and U.S. commercial real estate price indices, U.S. housing price index, and natural gas prices (Henry Hub).

Increases in the following macroeconomic variables will generally correlate with higher expected credit losses: Canadian and U.S. unemployment rates, Canadian overnight interest rates, Canadian and U.S. 10 year BBB corporate bond credit spreads, Canadian and U.S. 10 year government bond yields, and U.S. 10 year BBB corporate bond yield.

Increases in the following macroeconomic variables will generally correlate with lower expected credit losses: Canadian and U.S. housing price indices, Canadian and U.S. GDP, Canadian consumer confidence index, Canadian and U.S. commercial real estate price indices, and oil and natural gas prices.

Note 5 Loans and allowance for credit losses (continued)

Transfers between stages

Transfers between Stage 1 and Stage 2 are based on the assessment of significant increases in credit risk relative to initial recognition, as described in Note 2. The impact of moving from 12 months expected credit losses to lifetime expected credit losses, or vice versa, varies by product and is dependent on the expected remaining life at the date of the transfer. Stage transfers may result in significant fluctuations in expected credit losses.

The following table illustrates the impact of staging on our ACL by comparing our allowance if all performing loans were in Stage 1 to the actual ACL recorded on these assets.

	As at					
	October 31, 2022			October 31, 2021		
	ACL – All performing loans in Stage 1	**Impact of staging**	**Stage 1 and 2 ACL**	ACL – All performing loans in Stage 1	Impact of staging	Stage 1 and 2 ACL
Performing loans (1)	**$ 2,373**	**$ 1,094**	**$ 3,467**	$ 2,521	$ 1,125	$ 3,646

(1) Represents loans and commitments in Stage 1 and Stage 2.

Credit risk exposure by internal risk rating

The following table presents the gross carrying amount of loans measured at amortized cost, and the full contractual amount of undrawn loan commitments subject to the impairment requirements of IFRS 9. Risk ratings are based on internal ratings used in the measurement of expected credit losses as at the reporting date, as outlined in the internal ratings maps for Wholesale and Retail facilities in the Credit risk section of Management's Discussion and Analysis.

	As at							
	October 31, 2022				October 31, 2021			
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3 (1)	Total	Stage 1	Stage 2	Stage 3 (1)	Total
Retail								
Loans outstanding – Residential mortgages								
Low risk	$ 340,716	$ 2,573	$ –	$ 343,289	$ 310,334	$ 1,507	$ –	$ 311,841
Medium risk	15,035	1,932	–	16,967	15,152	2,051	–	17,203
High risk	1,188	3,125	–	4,313	3,343	634	–	3,977
Not rated (2)	51,915	1,304	–	53,219	45,512	913	–	46,425
Impaired	–	–	560	560	–	–	645	645
	408,854	8,934	560	418,348	374,341	5,105	645	380,091
Items not subject to impairment (3)				448				241
Total				$ 418,796				$ 380,332
Loans outstanding – Personal								
Low risk	$ 73,339	$ 2,575	$ –	$ 75,914	$ 72,267	$ 698	$ –	$ 72,965
Medium risk	5,482	3,780	–	9,262	4,974	4,551	–	9,525
High risk	836	1,660	–	2,496	687	1,045	–	1,732
Not rated (2)	9,733	104	–	9,837	8,934	88	–	9,022
Impaired	–	–	200	200	–	–	197	197
Total	$ 89,390	$ 8,119	$ 200	$ 97,709	$ 86,862	$ 6,382	$ 197	$ 93,441
Loans outstanding – Credit cards								
Low risk	$ 15,088	$ 83	$ –	$ 15,171	$ 12,864	$ 24	$ –	$ 12,888
Medium risk	1,418	1,911	–	3,329	1,646	1,645	–	3,291
High risk	39	1,255	–	1,294	136	937	–	1,073
Not rated (2)	751	32	–	783	527	43	–	570
Total	$ 17,296	$ 3,281	$ –	$ 20,577	$ 15,173	$ 2,649	$ –	$ 17,822
Loans outstanding – Small business								
Low risk	$ 8,571	$ 838	$ –	$ 9,409	$ 8,609	$ 274	$ –	$ 8,883
Medium risk	1,512	1,130	–	2,642	1,583	979	–	2,562
High risk	102	375	–	477	227	218	–	445
Not rated (2)	3	–	–	3	4	–	–	4
Impaired	–	–	138	138	–	–	109	109
Total	$ 10,188	$ 2,343	$ 138	$ 12,669	$ 10,423	$ 1,471	$ 109	$ 12,003
Undrawn loan commitments – Retail								
Low risk	$ 247,620	$ 1,041	$ –	$ 248,661	$ 229,516	$ 574	$ –	$ 230,090
Medium risk	9,021	246	–	9,267	9,475	133	–	9,608
High risk	876	367	–	1,243	1,205	97	–	1,302
Not rated (2)	5,668	118	–	5,786	4,854	90	–	4,944
Total	$ 263,185	$ 1,772	$ –	$ 264,957	$ 245,050	$ 894	$ –	$ 245,944
Wholesale – Loans outstanding								
Investment grade	$ 88,513	$ 202	$ –	$ 88,715	$ 62,975	$ 226	$ –	$ 63,201
Non-investment grade	145,908	15,758	–	161,666	117,396	15,146	–	132,542
Not rated (2)	11,789	360	–	12,149	9,339	430	–	9,769
Impaired	–	–	1,301	1,301	–	–	1,357	1,357
	246,210	16,320	1,301	263,831	189,710	15,802	1,357	206,869
Items not subject to impairment (3)				10,136				11,197
Total				$ 273,967				$ 218,066
Undrawn loan commitments – Wholesale								
Investment grade	$ 284,481	$ 179	$ –	$ 284,660	$ 246,539	$ 1,122	$ –	$ 247,661
Non-investment grade	126,225	10,657	–	136,882	108,063	12,377	–	120,440
Not rated (2)	3,692	1	–	3,693	3,476	1	–	3,477
Total	$ 414,398	$ 10,837	$ –	$ 425,235	$ 358,078	$ 13,500	$ –	$ 371,578

(1) As at October 31, 2022, 88% of credit-impaired loans were either fully or partially collateralized (October 31, 2021 -86%). For details on the types of collateral held against credit-impaired assets and our policies on collateral, refer to the Credit risk mitigation section of Management's Discussion and Analysis.

(2) In certain cases where an internal risk rating is not assigned, we use other approved credit risk assessments or rating methodologies, policies and tools to manage our credit risk.

(3) Items not subject to impairment are loans held at FVTPL.

Note 5 Loans and allowance for credit losses (continued)

Loans past due but not impaired (1), (2)

	As at					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars)	30 to 89 days	90 days and greater	Total	30 to 89 days	90 days and greater	Total
Retail	$ 1,328	$ 168	$ 1,496	$ 1,105	$ 137	$ 1,242
Wholesale	1,279	2	1,281	1,230	–	1,230
	$ 2,607	$ 170	$ 2,777	$ 2,335	$ 137	$ 2,472

(1) Excludes loans less than 30 days past due as they are not generally representative of the borrowers' ability to meet their payment obligations.

(2) Amounts presented may include loans past due as a result of administrative processes, such as mortgage loans on which payments are restrained pending payout due to sale or refinancing. Past due loans arising from administrative processes are not representative of the borrowers' ability to meet their payment obligations.

Note 6 Significant acquisition

Wealth Management

On September 27, 2022, we completed the acquisition of 100% of the issued share capital of Brewin Dolphin Holdings PLC (Brewin Dolphin) via our subsidiary, RBC Wealth Management (Jersey) Holdings Limited. Brewin Dolphin provides discretionary wealth management services in the U.K., Ireland and the Channel Islands. Brewin Dolphin's business gives us a platform to significantly transform our wealth management business in the U.K., Ireland and the Channel Islands, and provides us with the opportunity to position the combined businesses as a premier integrated wealth management provider to private and institutional clients.

Total consideration of £1,591 million ($2,341 million) as of the date of close consisted of £1,564 million ($2,302 million) in cash, as well as amounts related to share based compensation. Based on the estimated fair values, our preliminary purchase price allocation assigns $3,279 million to assets and $938 million to liabilities, including customer relationship intangible assets of $1,292 million and goodwill of $913 million, which is allocated to our International Wealth Management and Global Asset Management CGUs and is not deductible for tax purposes. Goodwill reflects the expected synergies from the combined businesses and the expected growth of the Wealth Management segment. The estimates for the fair values of the assets acquired and liabilities assumed may be retroactively adjusted to reflect new information obtained about facts and circumstances that existed as at the acquisition date during the measurement period.

The results of the acquisition have been consolidated from the date of close and included in our Wealth Management segment.

Note 7 Derecognition of financial assets

We enter into transactions in which we transfer financial assets such as loans or securities to structured entities or other third parties. The majority of assets transferred under repurchase agreements, securities lending agreements, and in our Canadian residential mortgage securitization transactions do not qualify for derecognition as we continue to be exposed to substantially all of the risks and rewards of the transferred assets, such as prepayment, credit, price, interest rate and foreign exchange risks.

Transferred financial assets derecognized

Government relief programs

To support our clients through unprecedented times due to the COVID-19 pandemic, we participated in government relief programs in Canada and in the U.S.

Under the Canadian Emergency Business Account program, we provided interest-free loans to existing eligible small business clients funded by the Export Development Bank of Canada (EDC). As we do not retain substantially all of the risks and rewards of the financial assets, and all cash flows are passed through to the EDC, these loans are not recognized on our Consolidated Balance Sheets. The application window for the CEBA program closed on June 30, 2021.

Transferred financial assets not derecognized

Securitization of Canadian residential mortgage loans

We periodically securitize insured Canadian residential mortgage loans through the creation of MBS pools under the National Housing Act MBS (NHA MBS) program. All loans securitized under the NHA MBS program are required to be insured by the Canadian Mortgage and Housing Corporation (CMHC) or a third-party insurer. We require the borrower to pay for mortgage insurance when the loan amount is greater than 80% of the original appraised value of the property (LTV ratio). For residential mortgage loans securitized under this program with LTV ratios less than 80%, we are required to insure the mortgages at our own expense. Under the NHA MBS program, we are responsible for making all payments due on our issued MBS, regardless of whether we collect the necessary funds from the mortgagor or the insurer. When a borrower defaults on a mortgage, we submit a claim to the insurer if the amount recovered from the collection or foreclosure process is lower than the sum of the principal balance, accrued interest and collection costs on the outstanding loan. The insurance claim process is managed by the insurance provider in accordance with the insurer's policies and covers the entire unpaid loan balance plus generally up to 12 months of interest, selling costs and other eligible expenses. If an insurance claim is denied, a loss is recognized in Provision for credit losses in our Consolidated Statements of Income. The amount recorded as a loss is not significant to our Consolidated Financial Statements and no significant losses were incurred due to legal action arising from mortgage defaults during 2022 and 2021.

We sell the NHA MBS pools primarily to Canada Housing Trust, a government-sponsored structured entity under the Canada Mortgage Bond (CMB) program. The entity periodically issues CMBs, which are guaranteed by the government, and sells them to third-party investors. Proceeds of the CMB issuances are used by the entity to purchase the NHA MBS pools from eligible NHA MBS issuers who participate in the issuance of a particular CMB series. Our continuing involvement includes servicing the underlying residential mortgage loans we have securitized, either ourselves or through a third-party servicer. We also act as

counterparty in interest rate swap agreements where we pay the entity the interest due to CMB investors and receive the interest on the underlying MBS and reinvested assets. As part of the swaps, we are also required to maintain a principal reinvestment account for principal payments received on the underlying mortgage loans to meet the repayment obligation upon maturity of the CMB. We reinvest the collected principal payments in permitted investments as outlined in the swap agreements.

We have determined that certain of the NHA MBS program loans transferred to the entity do not qualify for derecognition as we have not transferred substantially all of the risks and rewards of ownership. As a result, these transferred MBS continue to be classified as residential mortgage loans and recognized on our Consolidated Balance Sheets. The cash received for these transferred MBS is treated as a secured borrowing and a corresponding liability is recorded in Deposits – Business and government on our Consolidated Balance Sheets.

Securities sold under repurchase agreements and securities loaned

We also enter into transactions such as repurchase agreements and securities lending agreements where we transfer assets under agreements to repurchase them at a future date and retain substantially all of the risks and rewards associated with the assets. These transferred assets remain on our Consolidated Balance Sheets and are accounted for as collateralized borrowing transactions.

The following table provides information on the carrying amount and fair value of the transferred assets that did not qualify for derecognition, and their associated liabilities.

	As at							
	October 31, 2022				October 31, 2021			
(Millions of Canadian dollars)	**Canadian residential mortgage loans** (1), (2)	**Securities sold under repurchase agreements** (3)	**Securities loaned** (3)	**Total**	Canadian residential mortgage loans (1), (2)	Securities sold under repurchase agreements (3)	Securities loaned (3)	Total
Carrying amount of transferred assets that do not qualify for derecognition	**$ 32,812**	**$ 258,615**	**$ 15,332**	**$ 306,759**	$ 34,052	$ 252,920	$ 9,281	$ 296,253
Carrying amount of associated liabilities	**32,177**	**258,615**	**15,332**	**306,124**	33,769	252,920	9,281	295,970
Fair value of transferred assets	**$ 31,174**	**$ 258,615**	**$ 15,332**	**$ 305,121**	$ 34,142	$ 252,920	$ 9,281	$ 296,343
Fair value of associated liabilities	**30,900**	**258,615**	**15,332**	**304,847**	34,073	252,920	9,281	296,274
Fair value of net position	**$ 274**	**$ –**	**$ –**	**$ 274**	$ 69	$ –	$ –	$ 69

(1) Includes Canadian residential mortgage loans transferred primarily to Canada Housing Trust at the initial securitization and other permitted investments used for funding requirements after the initial securitization.

(2) CMB investors have legal recourse only to the transferred assets, and do not have recourse to our general assets.

(3) Does not include over-collateralization of assets pledged.

Note 8 Structured entities

In the normal course of business, we engage in a variety of financial transactions with structured entities to support our financing and investing needs as well as those of our clients. A structured entity is an entity in which voting or similar rights are not the dominant factor in deciding control. Structured entities are generally created to achieve a narrow and well defined objective with restrictions around their ongoing activities. We consolidate a structured entity when we control the entity in accordance with our accounting policy as described in Note 2. In other cases, we may sponsor or have an interest in such an entity but may not consolidate it.

Consolidated structured entities

We consolidate the following structured entities, whose assets and liabilities are recorded on our Consolidated Balance Sheets. Third-party investors in these structured entities generally have recourse only to the assets of the related entity and do not have recourse to our general assets unless we breach our contractual obligations to those entities. In the ordinary course of business, the assets of each consolidated structured entity can generally only be used to settle the obligations of that entity.

RBC-administered multi-seller conduits

We generally do not maintain ownership in the multi-seller conduits that we administer and generally do not have rights to, or control of, their assets. However, we issue asset-backed commercial paper (ABCP) through a multi-seller conduit that does not have an expected loss investor with substantive power to direct the significant operating activities of the conduit. This conduit is consolidated because we have exposure to variability of returns from performance in the multi-seller arrangements through providing transaction-specific and program-wide liquidity, credit and loan facilities to the conduit and have decision-making power over the relevant activities. As of October 31, 2022, $1,826 million of financial assets held by the conduit was included in Loans (October 31, 2021 – $1,076 million) and $1,284 million of ABCP issued by the conduit was included in Deposits (October 31, 2021 – $665 million) on our Consolidated Balance Sheets.

Credit card securitization vehicle

We securitize a portion of our credit card receivables through a structured entity on a revolving basis. The entity purchases co-ownership interests in a pool of credit card receivables and issues senior and subordinated term notes collateralized by that co-ownership interest in the underlying pool of credit card receivables. Investors who purchase the term notes have recourse only to that co-ownership interest in the underlying pool of credit card receivables.

We continue to service the credit card receivables and perform an administrative role for the entity. We also retain risk in the underlying pool of credit card receivables through our retained interest in the transferred assets, the cash reserve balance we fund from time to time, and also through certain subordinated notes which we retain. Additionally, we may own some senior

Note 8 Structured entities (continued)

notes as investments or for market-making activities and we act as counterparty to interest rate and cross currency swap agreements which hedge the entity's interest rate and currency risk exposure.

We consolidate the structured entity because we have decision-making power over the timing and size of future issuances and other relevant activities which were predetermined by us at inception. We also obtain significant funding benefits and are exposed to variability from the performance of the underlying credit card receivables through our retained interest. As at October 31, 2022, $6 billion of notes issued by our credit card securitization vehicle were included in Deposits on our Consolidated Balance Sheets (October 31, 2021 – $3 billion).

Collateralized commercial paper vehicle

We established a funding vehicle that provides loans to us and finances those loans by issuing commercial paper to third-party investors. The structured entity's commercial paper carries an equivalent credit rating to RBC because we are obligated to advance funds to the entity in the event there are insufficient funds from other sources to settle maturing commercial paper. We pledge collateral to secure the loans and are exposed to the market and credit risks of the pledged securities.

We consolidate the structured entity because we have decision-making power over the relevant activities, are the sole borrower from the structure, and are exposed to a majority of the residual ownership risks through the credit support provided. As at October 31, 2022, $14 billion of commercial paper issued by the vehicle was included in Deposits on our Consolidated Balance Sheets (October 31, 2021 – $13 billion).

Covered bonds

We periodically transfer mortgages to RBC Covered Bond Guarantor Limited Partnership (the Guarantor LP) to support funding activities and asset coverage requirements under our covered bonds program. The Guarantor LP was created to guarantee interest and principal payments under the covered bond program. The covered bonds guaranteed by the Guarantor LP are direct, unsecured and unconditional obligations of RBC; therefore, investors have a claim against the Bank which will continue if the covered bonds are not paid by the Bank and the mortgage assets in the Guarantor LP are insufficient to satisfy the obligations owing on the covered bonds. We act as general partner, limited partner, swap counterparty, lender and liquidity provider to the Guarantor LP, servicer for the underlying mortgages as well as the registered issuer of the covered bonds.

We consolidate the Guarantor LP as we have the decision-making power over the relevant activities through our role as general partner and are exposed to variability from the performance of the underlying mortgages. As at October 31, 2022, the total amount of mortgages transferred and outstanding was $121 billion (October 31, 2021 – $80 billion) and $43 billion of covered bonds were recorded as Deposits on our Consolidated Balance Sheets (October 31, 2021 – $37 billion).

Municipal bond TOB structures

We sell taxable and tax-exempt municipal bonds into Tender Option Bond (TOB) structures, which consist of a bond that is credit enhanced by us and purchased by a TOB trust. The TOB trust finances the purchase from us by issuing floating-rate certificates to short-term investors and a residual certificate that is purchased by us. We are the remarketing agent for the floating-rate certificates and provide a liquidity facility to the short-term investors which requires us to purchase any certificates tendered but not successfully remarketed. We credit enhance the bond purchased by the TOB trust with a letter of credit under which we are required to extend funding if there are any losses on the underlying bonds. We earn interest on the residual certificate and receive market-based fees for acting as remarketing agent and providing the liquidity facility and letter of credit.

We consolidate the TOB trust when we are the holder of the residual certificate as we have decision-making power over the relevant activities, including the selection of the underlying municipal bonds and the ability to terminate the structure, and are exposed to variability from the performance of the underlying municipal bonds. As at October 31, 2022, $6 billion of municipal bonds were included in Investment securities related to consolidated TOB structures (October 31, 2021 – $7 billion) and a corresponding $7 billion of floating-rate certificates were included in Deposits on our Consolidated Balance Sheets (October 31, 2021 – $7 billion).

RBC managed investment funds

We are sponsors and investment managers of mutual and pooled funds, which give us the ability to direct the investment decisions of the funds. We consolidate those mutual and pooled funds in which our interests, which include direct investment in seed capital plus management or performance fees, indicate that we are acting as a principal. As at October 31, 2022, $524 million of Trading securities held in the consolidated funds (October 31, 2021 – $514 million) and $363 million of Other liabilities representing the fund units held by third parties (October 31, 2021 – $365 million) were recorded on our Consolidated Balance Sheets.

Unconsolidated structured entities

We have interests in certain structured entities that we do not consolidate but have recorded assets and liabilities on our Consolidated Balance Sheets related to our transactions and involvement with these entities.

The following table presents the assets and liabilities recorded on our Consolidated Balance Sheets and our maximum exposure to loss related to our interests in unconsolidated structured entities. It also presents the size of each class of unconsolidated structured entity, as measured by the total assets of the entities in which we have an interest.

	As at October 31, 2022					
(Millions of Canadian dollars)	Multi-seller conduits (1)	Structured finance	Non-RBC managed investment funds	Third-party securitization vehicles	Other	Total
On-balance sheet assets						
Securities	$ 255	$ –	$ 3,089	$ –	$ 595	$ 3,939
Loans	–	5,334	–	8,494	2,487	16,315
Derivatives	25	–	–	–	100	125
Other assets	–	6	–	–	568	574
	$ 280	$ 5,340	$ 3,089	$ 8,494	$ 3,750	$ 20,953
On-balance sheet liabilities						
Derivatives	$ 171	$ –	$ –	$ –	$ –	$ 171
	$ 171	$ –	$ –	$ –	$ –	$ 171
Maximum exposure to loss (2)	$ 48,260	$ 8,658	$ 3,758	$ 14,339	$ 5,523	$ 80,538
Total assets of unconsolidated structured entities	$ 47,289	$ 26,543	$ 548,320	$ 64,361	$ 554,573	$ 1,241,086

	As at October 31, 2021					
(Millions of Canadian dollars)	Multi-seller conduits (1)	Structured finance	Non-RBC managed investment funds	Third-party securitization vehicles	Other	Total
On-balance sheet assets						
Securities	$ 12	$ –	$ 3,047	$ –	$ 537	$ 3,596
Loans	–	4,569	–	6,855	1,453	12,877
Derivatives	17	–	–	–	108	125
Other assets	–	27	–	–	363	390
	$ 29	$ 4,596	$ 3,047	$ 6,855	$ 2,461	$ 16,988
On-balance sheet liabilities						
Derivatives	$ 93	$ –	$ –	$ –	$ –	$ 93
	$ 93	$ –	$ –	$ –	$ –	$ 93
Maximum exposure to loss (2)	$ 40,893	$ 8,361	$ 3,651	$ 12,214	$ 4,057	$ 69,176
Total assets of unconsolidated structured entities	$ 40,074	$ 19,881	$ 506,699	$ 80,458	$ 392,348	$ 1,039,460

(1) Total assets of unconsolidated structured entities represent the maximum assets that may have to be purchased by the conduits under purchase commitments outstanding. Of the purchase commitments outstanding, the conduits have purchased financial assets totalling $32 billion as at October 31, 2022 (October 31, 2021 – $25 billion).

(2) The maximum exposure to loss resulting from our interests in these entities consists mostly of investments, loans, fair value of derivatives, liquidity and credit enhancement facilities. The maximum exposure to loss of the multi-seller conduits is higher than the on-balance sheet assets primarily because of the notional amounts of the backstop liquidity and credit enhancement facilities. Refer to Note 24.

Below is a description of our involvement with each significant class of unconsolidated structured entity.

Multi-seller conduits

We administer multi-seller ABCP conduit programs. Multi-seller conduits primarily purchase financial assets from clients and finance those purchases by issuing ABCP.

In certain multi-seller conduit arrangements, we do not maintain any ownership of the multi-seller conduits that we administer and have no rights to, or control of, its assets. As the administrative agent, we earn a residual fee for providing services such as coordinating funding activities, transaction structuring, documentation, execution and monitoring. The ABCP issued by each multi-seller conduit is in the conduit's own name with recourse to the financial assets owned by the multi-seller conduit, and is non-recourse to us except through our participation in liquidity and/or credit enhancement facilities.

We provide transaction-specific and program-wide liquidity facilities to the multi-seller conduits. In addition, we provide program-wide credit enhancement to the multi-seller conduits which obligate us to purchase assets or advance funds in the event the multi-seller conduit does not otherwise have funds from other sources, such as from the liquidity facilities, to settle maturing ABCP. In some cases, we or another third party may provide transaction-specific credit enhancement which can take various forms. We receive market-based fees for providing these liquidity and credit facilities.

For certain transactions, we act as counterparty to various hedging contracts to facilitate our clients' securitization of fixed rate and/or foreign currency denominated assets through the conduits. These may take the form of forward contracts, interest rate swaps or cross currency swaps. These derivatives expose us to foreign exchange and interest rate risks that are centrally managed by our foreign exchange trading and swap desks, respectively, and credit risk on the underlying assets that is mitigated by the credit enhancement described below.

Each transaction is structured with transaction-specific first loss protection provided by the third-party seller. This enhancement can take various forms, including but not limited to overcollateralization, excess spread, subordinated classes of financial assets, guarantees or letters of credit. The amount of this enhancement varies but is generally designed to cover a multiple of historical losses.

Note 8 Structured entities (continued)

An unrelated third party (expected loss investor) absorbs losses, up to a maximum contractual amount, that may occur in the future on the assets in the multi-seller conduits before the multi-seller conduits' debt holders and us. In return for assuming this multi-seller conduit first-loss position, each multi-seller conduit pays the expected loss investor a return commensurate with its risk position. The expected loss investor has substantive power to direct the majority of the activities which significantly impact the conduit's economic performance, including initial selection and approval of the asset purchase commitments and liquidity facilities, approval of renewal and amendment of these transactions and facilities, sale or transfer of assets, ongoing monitoring of asset performance, mitigation of losses, and management of the ABCP liabilities.

We do not consolidate these multi-seller conduits as we do not control the conduits as noted above.

Structured finance

We participate in certain municipal bond TOB structures that we do not consolidate. These structures are similar to those consolidated municipal bond TOB structures described above; however, the residual certificates are held by third parties. We provide liquidity facilities for the benefit of floating-rate certificate holders which may be drawn if certificates are tendered but not able to be remarketed. For a portion of these trusts, we also provide a letter of credit for the underlying bonds held in the trust. We do not have decision-making power over the relevant activities of the structures; therefore, we do not consolidate these structures.

We provide senior warehouse financing to unaffiliated structured entities that are established by third parties to acquire loans for the purposes of issuing a term collateralized loan obligation (CLO) transaction. Subordinated financing is provided during the warehouse phase by either the collateral manager or third-party investors. Subordinated financing serves as the first loss tranche which absorbs losses prior to ourselves as the senior lender. We act as the arranger and placement agent for the term CLO transaction. Proceeds from the sale of the term CLO are used to repay our senior warehouse financing, at which point we have no further involvement with the transaction. We do not consolidate these CLO structures as we do not have decision-making power over the relevant activities of the entity, which include the initial selection and subsequent management of the underlying debt portfolio.

We provide senior financing to unaffiliated structured entities that are established by third parties to acquire loans. Subordinated financing is provided by either the collateral manager or third-party investors. Subordinated financing serves as the first loss tranche which absorbs losses prior to ourselves as the senior lender. These facilities tend to be longer in term than the CLO warehouse facilities and benefit from credit enhancement generally designed to cover a multiple of historical losses. We do not consolidate these structures as we do not have decision making power over the relevant activities of the entity, which include the initial selection and subsequent management of the underlying debt portfolio.

Non-RBC managed investment funds

We enter into fee-based equity derivative transactions with third parties including mutual funds, unit investment trusts and other investment funds. These transactions provide their investors with the desired exposure to reference funds, and we economically hedge our exposure to these derivatives by investing in those reference funds. We also act as custodian for several funds. We do not consolidate those reference funds that are managed by third parties as we do not have power to direct their investing activities.

We provide liquidity facilities to certain third-party investment funds. The funds issue unsecured variable-rate preferred shares and invest in portfolios of tax-exempt municipal bonds. Undrawn liquidity commitments expose us to the liquidity risk of the preferred shares and drawn commitments expose us to the credit risk of the underlying municipal bonds. We do not consolidate these third-party managed funds as we do not have power to direct their investing activities.

Third-party securitization vehicles

We hold interests in securitization vehicles that provide funding to certain third parties on whose behalf the entities were created. The activities of these entities are limited to the purchase and sale of specified financial assets from the sponsor. We, as well as other financial institutions, are obligated to provide funding up to our maximum commitment level and are exposed to credit losses on the underlying assets after various credit enhancements. Enhancements can take various forms, including but not limited to overcollateralization, excess spread, subordinated classes of financial assets, guarantees or letters of credit. The amount of this enhancement varies but is generally designed to cover a multiple of historical losses. We do not consolidate these entities as we do not have decision-making power over the relevant activities, including the entities' investing and financing activities.

Other

Other unconsolidated structured entities include managed investment funds, credit investment products and tax credit funds.

We are sponsors and investment managers of mutual and pooled funds, which gives us the ability to direct the investment decisions of the funds. We do not consolidate those mutual and pooled funds if we exercise our decision-making power as an agent on behalf of other unit holders.

We use structured entities to generally transform credit derivatives into cash instruments, to distribute credit risk and to create customized credit products to meet investors' specific requirements. We enter into derivative contracts, including credit derivatives, to purchase protection from these entities (credit protection) and convert various risk factors such as yield, currency or credit risk of underlying assets to meet the needs of the investors. We act as sole arranger and swap provider for certain entities and, in some cases, fulfill other administrative functions for the entities. We do not consolidate these credit investment product entities as we do not have decision-making power over the relevant activities, which include selection of the collateral and reference portfolio, and are not exposed to a majority of the benefits or risks of the entities.

We created certain funds to pass through tax credits received from underlying low-income housing, historic rehabilitation real estate projects to third parties, new market tax credits or renewable energy tax credits to third parties (tax credit funds). We are sponsors of the tax credit funds as a result of our responsibility to manage the funds, arrange the financing, and perform the administrative duties of these tax credit funds. We do not consolidate the tax credit funds as the third-party investors in these funds have the decision-making power to select the underlying investments and are exposed to the majority of the residual ownership and tax risks of the funds.

We also purchase passive interests in renewable energy tax credit entities created and controlled by third parties. We do not consolidate these third-party funds as we do not have decision-making power over the relevant activities and our investments are managed as part of larger portfolios which are held for trading purposes.

Other interests in unconsolidated structured entities
In the normal course of business, we buy and sell passive interests in certain third-party structured entities, including mutual funds, exchange traded funds, and government-sponsored ABS vehicles. Our investments in these entities are managed as part of larger portfolios which are held for trading, liquidity or hedging purposes. We did not create or sponsor these entities and do not have any decision-making power over their ongoing activities. Our maximum exposure to loss is limited to our on-balance sheet investments in these entities, which are not included in the table above. As at October 31, 2022 and 2021, our investments in these entities were included in Trading and Investment securities on our Consolidated Balance Sheets. Refer to Note 3 and Note 4 for further details on our Trading and Investment securities.

Sponsored entities
We are a sponsor of certain structured entities in which we have interests but do not consolidate. In determining whether we are a sponsor of a structured entity, we consider both qualitative and quantitative factors, including the purpose and nature of the entity, our initial and continuing involvement and whether we hold subordinated interests in the entity. We are considered to be the sponsor of certain credit investment products, tax credit entities, RBC managed mutual funds and a commercial mortgage securitization vehicle. During the year ended October 31, 2022, we transferred commercial mortgages with a carrying amount of $450 million (October 31, 2021 – $nil) to a sponsored securitization vehicle in which we did not have any interests as at the end of the reporting period.

Financial support provided to structured entities
During the years ended October 31, 2022 and 2021, we have not provided any financial or non-financial support to any consolidated or unconsolidated structured entities when we were not contractually obligated to do so. Furthermore, we have no intention to provide such support in the future.

Note 9 Derivative financial instruments and hedging activities

Derivative instruments are categorized as either financial or non-financial derivatives. Financial derivatives are financial contracts whose value is derived from an underlying interest rate, foreign exchange rate, credit risk, and equity or equity index. Non-financial derivatives are contracts whose value is derived from a precious metal, commodity instrument or index. The notional amount of derivatives represents the contract amount used as a reference point to calculate payments. Notional amounts are generally not exchanged by counterparties, and do not reflect our EAD.

Financial derivatives
Forwards and futures
Forward contracts are non-standardized agreements that are transacted between counterparties in the OTC market, whereas futures are standardized contracts with respect to amounts and settlement dates, and are traded on regular futures exchanges. Examples of forwards and futures are described below.

Interest rate forwards (forward rate agreements) and futures are contractual obligations to buy or sell an interest-rate sensitive financial instrument on a predetermined future date at a specified price.

Foreign exchange forwards and futures are contractual obligations to exchange one currency for another at a specified price for settlement at a predetermined future date.

Equity forwards and futures are contractual obligations to buy or sell at a fixed value (the specified price) of an equity index, a basket of stocks or a single stock at a predetermined future date.

Swaps
Swaps are OTC contracts in which two counterparties exchange a series of cash flows based on agreed upon rates applied to a notional amount. Examples of swap agreements are described below.

Interest rate swaps are agreements where two counterparties exchange a series of payments based on different interest rates applied to a notional amount in a single currency. Certain interest rate swaps are transacted and settled through clearing houses which act as central counterparties. Cross currency swaps involve the exchange of fixed payments in one currency for the receipt of fixed payments in another currency. Cross currency interest rate swaps involve the exchange of both interest and notional amounts in two different currencies.

Equity swaps are contracts in which one counterparty agrees to pay or receive from the other cash flows based on changes in the value of an equity index, a basket of stocks or a single stock.

Options
Options are contractual agreements under which the seller (writer) grants the purchaser the right, but not the obligation, either to buy (call option) or sell (put option) a security, exchange rate, interest rate, or other financial instrument or commodity at a specified price, at or by a predetermined future date. The seller (writer) of an option can also settle the contract by paying the cash settlement value of the purchaser's right. The seller (writer) receives a premium from the purchaser for this right. The various option agreements that we enter into include but are not limited to interest rate options, foreign currency options, equity options and index options.

Credit derivatives
Credit derivatives are OTC contracts that transfer credit risk related to an underlying financial instrument (referenced asset) from one counterparty to another. Credit derivatives include credit default swaps, credit default baskets and total return swaps.

Credit default swaps provide protection against the decline in the value of the referenced asset as a result of specified credit events such as default or bankruptcy. They are similar in structure to an option, whereby the purchaser pays a premium to the seller of the credit default swap in return for payment contingent on a credit event affecting the referenced asset.

Credit default baskets are similar to credit default swaps except that the underlying referenced financial instrument is a group of assets instead of a single asset.

Note 9 Derivative financial instruments and hedging activities (continued)

Total return swaps are contracts where one counterparty agrees to pay or receive from the other cash amounts based on changes in the value of a referenced asset or group of assets, including any returns such as interest earned on these assets, in exchange for amounts that are based on prevailing market funding rates.

Other derivative products
Other contracts are stable value and equity derivative contracts.

Non-financial derivatives
Other contracts also include non-financial derivative products such as precious metal and commodity derivative contracts in both the OTC and exchange markets.

Derivatives issued for trading purposes
Most of our derivative transactions relate to client-driven sales and trading activities, and associated market risk hedging. Sales activities include the structuring and marketing of derivative products to clients, enabling them to modify or reduce risks. Trading involves market-making, positioning and arbitrage activities. Market-making involves quoting bid and offer prices to other market participants with the intention of generating revenue based on spread and volume. Positioning involves the active management of derivative transactions with the expectation of profiting from favourable movements in prices, rates, or indices. Arbitrage activities involve identifying and profiting from price differentials between markets and product types. Any realized and unrealized gains or losses on derivatives used for trading purposes are recognized immediately in Non-interest income – Trading revenue.

Derivatives issued for other-than-trading purposes
We also use derivatives for purposes other than trading, primarily for hedging, in conjunction with the management of interest rate, credit, equity and foreign exchange risk related to our funding, lending, investment activities and asset/liability management.

Interest rate swaps are used to manage our exposure to interest rate risk by modifying the repricing or maturity characteristics of existing and/or forecasted assets and liabilities, including funding and investment activities. Purchased options are used to hedge redeemable deposits and other options embedded in consumer products. We manage our exposure to foreign currency risk with cross currency swaps and foreign exchange forward contracts. We predominantly use credit derivatives to manage our credit exposures. We mitigate industry sector concentrations and single-name exposures related to our credit portfolio by purchasing credit derivatives to transfer credit risk to third parties.

Certain derivatives and cash instruments are specifically designated and qualify for hedge accounting. From time to time, we also enter into derivative transactions to economically hedge certain exposures that do not otherwise qualify for hedge accounting, or where hedge accounting is not considered economically feasible to implement. In such circumstances, changes in fair value are reflected in Other income in Non-interest income.

Notional amount of derivatives by term to maturity (absolute amounts) (1)

	As at October 31, 2022					
	Term to maturity					
(Millions of Canadian dollars)	Within 1 year	1 through 5 years	Over 5 years	Total	Trading	Other than Trading
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	$ 763,398	$ 44,188	$ 353	$ 807,939	$ 806,576	$ 1,363
Swaps	4,994,006	6,934,996	4,781,148	16,710,150	16,001,414	708,736
Options purchased	100,504	577,780	151,084	829,368	829,368	–
Options written	108,770	556,652	182,841	848,263	848,263	–
Foreign exchange contracts						
Forward contracts	2,187,124	86,136	2,648	2,275,908	2,230,901	45,007
Cross currency swaps	87,942	67,345	82,659	237,946	233,617	4,329
Cross currency interest rate swaps	518,244	1,572,490	879,541	2,970,275	2,918,063	52,212
Options purchased	58,075	18,061	3,199	79,335	79,335	–
Options written	62,266	16,623	3,274	82,163	82,163	–
Credit derivatives (2)	1,143	35,621	6,751	43,515	42,785	730
Other contracts (3)	228,709	93,431	19,392	341,532	327,860	13,672
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	148,032	50,869	–	198,901	197,251	1,650
Futures – short positions	233,941	98,763	65	332,769	332,320	449
Options purchased	56,353	12,173	–	68,526	68,526	–
Options written	16,394	6,168	–	22,562	22,562	–
Foreign exchange contracts						
Futures – long positions	164	–	–	164	164	–
Other contracts	539,103	89,147	2,094	630,344	630,344	–
	$ 10,104,168	$ 10,260,443	$ 6,115,049	$ 26,479,660	$ 25,651,512	$ 828,148

(Millions of Canadian dollars)	As at October 31, 2021					
	Term to maturity					
	Within 1 year	1 through 5 years	Over 5 years	Total	Trading	Other than Trading
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	$ 866,704	$ 161,835	$ 158	$ 1,028,697	$ 1,015,263	$ 13,434
Swaps	3,936,638	6,559,032	4,268,243	14,763,913	14,259,757	504,156
Options purchased	266,798	312,149	185,547	764,494	764,494	–
Options written	271,000	309,540	203,665	784,205	784,205	–
Foreign exchange contracts						
Forward contracts	1,730,712	56,335	2,491	1,789,538	1,753,075	36,463
Cross currency swaps	82,316	57,968	72,864	213,148	204,789	8,359
Cross currency interest rate swaps	439,169	1,193,669	776,062	2,408,900	2,376,225	32,675
Options purchased	46,060	16,097	3,059	65,216	65,216	–
Options written	53,342	16,122	3,060	72,524	72,524	–
Credit derivatives (2)	1,027	35,759	6,125	42,911	42,428	483
Other contracts (3)	218,270	98,850	20,757	337,877	325,226	12,651
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	110,285	148,262	333	258,880	256,020	2,860
Futures – short positions	173,039	97,364	126	270,529	270,129	400
Options purchased	28,071	15,250	–	43,321	43,321	–
Options written	22,272	1,300	–	23,572	23,572	–
Foreign exchange contracts						
Futures – long positions	129	–	–	129	129	–
Other contracts	391,339	84,135	1,175	476,649	476,649	–
	$ 8,637,171	$ 9,163,667	$ 5,543,665	$ 23,344,503	$ 22,733,022	$ 611,481

(1) The derivative notional amounts are determined using the standardized approach for measuring counterparty credit risk(SA-CCR) in accordance with the Capital Adequacy Requirements (CAR).
(2) Credit derivatives with a notional value of $ billion (October 31, 2021 – $ billion) are economic hedges. Trading credit derivatives comprise protection purchased of $6 billion (October 31, 2021 – $25 billion) and protection sold of $17 billion (October 31, 2021 – $7 billion).
(3) Other contracts exclude loanunderwriting commitments of $6 billion (October 31, 2021 – $ billion), which are not classified as derivatives under CAR guidelines.

Fair value of derivative instruments (1)

(Millions of Canadian dollars)	As at			
	October 31, 2022		October 31, 2021	
	Positive	**Negative**	Positive	Negative
Held or issued for trading purposes				
Interest rate contracts				
Forward rate agreements	**$ 77**	**$ 25**	$ 10	$ 11
Swaps	**25,690**	**21,608**	28,400	23,136
Options purchased	**12,056**	**–**	4,580	–
Options written	**–**	**12,201**	–	5,258
	37,823	**33,834**	32,990	28,405
Foreign exchange contracts				
Forward contracts	**37,734**	**37,631**	11,404	11,515
Cross currency swaps	**8,680**	**9,087**	4,469	4,929
Cross currency interest rate swaps	**49,758**	**38,230**	23,208	22,382
Options purchased	**2,623**	**–**	1,021	–
Options written	**–**	**2,571**	–	978
	98,795	**87,519**	40,102	39,804
Credit derivatives	**388**	**125**	34	115
Other contracts	**18,474**	**21,084**	20,827	21,253
	155,480	**142,562**	93,953	89,577
Held or issued for other-than-trading purposes				
Interest rate contracts				
Swaps	**2,244**	**6,880**	1,187	1,116
	2,244	**6,880**	1,187	1,116
Foreign exchange contracts				
Forward contracts	**268**	**237**	305	260
Cross currency swaps	**–**	**22**	32	–
Cross currency interest rate swaps	**374**	**6,677**	859	447
	642	**6,936**	1,196	707
Credit derivatives	**–**	**–**	–	5
Other contracts	**313**	**273**	329	321
	3,199	**14,089**	2,712	2,149
Total gross fair values before:	**158,679**	**156,651**	96,665	91,726
Valuation adjustments determined on a pooled basis	**(2,055)**	**(975)**	(810)	27
Impact of netting agreements that qualify for balance sheet offset	**(2,185)**	**(2,185)**	(314)	(314)
	$ 154,439	**$ 153,491**	$95,541	$91,439

(1) The fair value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

Note 9 Derivative financial instruments and hedging activities (continued)

Fair value of derivative instruments by term to maturity (1)

	As at							
	October 31, 2022				October 31, 2021			
(Millions of Canadian dollars)	**Less than 1 year**	**1 through 5 years**	**Over 5 years**	**Total**	Less than 1 year	1 through 5 years	Over 5 years	Total
Derivative assets	**$ 56,050**	**56,792**	**41,597**	**$ 154,439**	$ 27,771	28,029	39,741	$ 95,541
Derivative liabilities	**58,504**	**54,361**	**40,626**	**153,491**	26,766	27,938	36,735	91,439

(1) The fair value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

Interest rate benchmark reform (1)

We use interest rate contracts in fair value hedges and cash flow hedges to manage our exposure to interest rate risk of our existing and/or forecast assets and liabilities. We also use foreign denominated deposit liabilities in net investment hedges to manage the foreign exchange risk arising from our investments in foreign operations. The hedging instruments designated to manage these risks reference IBORs in multiple jurisdictions and will be affected by the Reform as the markets transition to ABRs as discussed in Note 2.

The following table presents the notional or principal amount of our hedging instruments which reference IBORs that will be affected by the Reform as discussed in Note 2. The notional or principal amounts of our hedging instruments also approximates the extent of the risk exposure we manage through hedging relationships:

	As at	
	October 31, 2022	October 31, 2021
(Millions of Canadian dollars)	**Notional/Principal amounts**	Notional/Principal amounts
Interest rate contracts		
USD LIBOR	**$ 40,208**	$ 38,730
GBP LIBOR	**–**	290
CDOR	**114,159**	76,931
Total Return Swaps		
CDOR	**801**	390
Non-derivative instruments		
USD LIBOR	**237**	215
	$ 155,405	$ 116,556

(1) Excludes interest rate contracts andnon-derivative instruments which reference rates in multi-rate jurisdictions, including EURO Interbank Offered Rate and Australian Bank Bill Swap Rate (BBSW).

Derivative-related credit risk

Credit risk from derivative transactions is generated by the potential for the counterparty to default on its contractual obligations when one or more transactions have a positive market value to us. Therefore, derivative-related credit risk is represented by the positive fair value of the instrument and is normally a small fraction of the contract's notional amount.

We subject our derivative transactions to the same credit approval, limit and monitoring standards that we use for managing other transactions that create credit exposure. This includes evaluating the creditworthiness of counterparties, and managing the size, diversification and maturity structure of the portfolio. Credit utilization for all products is compared with established limits on a continual basis and is subject to a standard exception reporting process. We use a single internal rating system for all credit risk exposure, as outlined in the internal ratings maps in the Credit risk section of Management's Discussion and Analysis.

Offsetting is a technique that can reduce credit exposure from derivatives and is generally facilitated through the use of master netting agreements and achieved when specific criteria are met in accordance with our accounting policy in Note 2. A master netting agreement provides for a single net settlement of all financial instruments covered by the agreement in the event of default. However, credit risk is reduced only to the extent that our financial obligations to the same counterparty can be set off against obligations of the counterparty to us. We maximize the use of master netting agreements to reduce derivative-related credit exposure. Our overall exposure to credit risk that is reduced through master netting agreements may change substantially following the reporting date as the exposure is affected by each transaction subject to the agreement as well as by changes in underlying market rates. Measurement of our credit exposure arising out of derivative transactions is reduced to reflect the effects of netting in cases where the enforceability of that netting is supported by appropriate legal analysis as documented in our trading credit risk policies.

The use of collateral is another significant credit mitigation technique for managing derivative-related counterparty credit risk. Mark-to-market provisions in our agreements with some counterparties, typically in the form of a Credit Support Annex, provide us with the right to request that the counterparty pay down or collateralize the current market value of its derivatives positions when the value exceeds a specified threshold amount.

Replacement cost and credit equivalent amounts are determined in accordance with OSFI's non-modelled regulatory SA-CCR under the CAR guidelines. The replacement cost represents the total fair value of all outstanding contracts in a gain position after factoring in the master netting agreements and applicable margins, scaled by a regulatory factor. The credit equivalent amount is defined as the replacement cost plus an additional amount for potential future credit exposure also scaled by a regulatory factor. The risk-weighted equivalent is determined by applying appropriate risk-weights to the credit equivalent amount, including those risk weights reflective of model approval under the internal ratings based approach.

Derivative-related credit risk (1)

(Millions of Canadian dollars)	As at October 31, 2022 Replacement cost	Credit equivalent amount	Risk-weighted equivalent (2)	As at October 31, 2021 Replacement cost	Credit equivalent amount	Risk-weighted equivalent (2)
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	**$ 46**	**$ 76**	**$ 5**	$ 9	$ 64	$ 20
Swaps	**9,699**	**21,698**	**5,187**	4,519	16,203	4,569
Options purchased	**108**	**426**	**119**	113	403	187
Options written	**15**	**543**	**164**	23	415	141
Foreign exchange contracts						
Forward contracts	**8,772**	**29,565**	**5,940**	3,085	19,097	4,232
Swaps	**6,072**	**22,188**	**4,556**	2,621	16,484	4,092
Options purchased	**536**	**1,111**	**340**	177	510	145
Options written	**28**	**313**	**86**	2	196	43
Credit derivatives	**299**	**766**	**114**	913	2,234	213
Other contracts	**5,196**	**20,457**	**7,520**	7,668	26,567	10,480
Exchange-traded contracts	**11,098**	**19,870**	**397**	1,814	6,218	124
	$ 41,869	**$117,013**	**$ 24,428**	$ 20,944	$ 88,391	$ 24,246

(1) The amounts presented are net of master netting agreements in accordance with CAR guidelines.

(2) The risk-weighted balances are calculated in accordance with CAR guidelines and exclude CVA of $6 billion (October 31, 2021 – $8 billion).

Replacement cost of derivative instruments by risk rating and by counterparty type

(Millions of Canadian dollars)	As at October 31, 2022 Risk rating (1) AAA, AA	A	BBB	BB or lower	Total	Counterparty type (2) Banks	OECD governments	Other	Total
Gross positive fair values	**$ 39,001**	**$ 72,983**	**$ 29,690**	**$ 17,005**	**$ 158,679**	**$ 73,616**	**$ 22,727**	**$ 62,336**	**$ 158,679**
Impact of master netting agreements and applicable margins	**21,552**	**62,614**	**21,818**	**10,826**	**116,810**	**71,582**	**22,597**	**22,631**	**116,810**
Replacement cost (after netting agreements)	**$ 17,449**	**$ 10,369**	**$ 7,872**	**$ 6,179**	**$ 41,869**	**$ 2,034**	**$ 130**	**$ 39,705**	**$ 41,869**

(Millions of Canadian dollars)	As at October 31, 2021 Risk rating (1) AAA, AA	A	BBB	BB or lower	Total	Counterparty type (2) Banks	OECD governments	Other	Total
Gross positive fair values	$ 22,801	$ 37,938	$ 16,333	$ 19,593	$ 96,665	$ 42,361	$ 15,964	$ 38,340	$ 96,665
Impact of master netting agreements and applicable margins	20,545	33,257	12,050	9,869	75,721	41,554	15,731	18,436	75,721
Replacement cost (after netting agreements)	$ 2,256	$ 4,681	$ 4,283	$ 9,724	$ 20,944	$ 807	$ 233	$ 19,904	$ 20,944

(1) Our internal risk ratings of AAA, AA, A and BBB represent investment grade ratings and ratings of BB or lower represent non-investment grade ratings, as outlined in the internal ratings maps in the Credit risk section of Management's Discussion and Analysis.

(2) Counterparty type is defined in accordance with CAR guidelines.

Derivatives in hedging relationships

We apply hedge accounting to minimize volatility in earnings and capital caused by changes in interest rates or foreign exchange rates. Interest rate and currency fluctuations will either cause assets and liabilities to appreciate or depreciate in market value or cause variability in forecasted cash flows. When a hedging relationship is effective, gains, losses, revenue and expenses of the hedging instrument will offset the gains, losses, revenue and expenses of the hedged item.

Derivatives used in hedging relationships are recorded in Other Assets – Derivatives or Other Liabilities – Derivatives on the Balance Sheet. Foreign currency-denominated liabilities used in net investment hedging relationships are recorded in Deposits – Business and Government and Subordinated debentures on the Balance Sheet. Gains and losses relating to hedging ineffectiveness is recorded in Non-Interest income and amounts reclassified from hedge reserves in OCI to income is recorded in Net-interest income for cash flow hedges and Non-interest income for net Investment hedges.

We assess and measure the effectiveness of a hedging relationship based on the change in the fair value or cash flows of the derivative hedging instrument relative to the change in the fair value or cash flows of the hedged item attributable to the hedged risk. When cash instruments are designated as hedges of foreign exchange risks, only changes in their value due to foreign exchange risk are included in the assessment and measurement of hedge effectiveness.

Potential sources of ineffectiveness can be attributed to differences between hedging instruments and hedged items:

- Mismatches in the terms of hedged items and hedging instruments, for example the frequency and timing of when interest rates are reset and frequency of payment.
- Difference in the discounting factors between the hedged item and the hedging instrument, taking into consideration the different reset frequency of the hedged item and hedging instrument.
- Hedging derivatives with a non-zero fair value at inception date of the hedging relationship, resulting in mismatch in terms with the hedged item.

Note 9 Derivative financial instruments and hedging activities (continued)

Below is a description of our risk management strategy for each risk exposure that we decide to hedge:

Interest rate risk

We use interest rate contracts to manage our exposure to interest rate risk by modifying the repricing characteristics of existing and/or forecasted assets and liabilities, including funding and investment activities. The swaps are designated in either a fair value hedge or a cash flow hedge and predominantly reference IBORs across multiple jurisdictions. Certain swaps will be affected by the Reform as the market transitions to ABRs.

For fair value hedges, we use interest rate contracts to manage the fair value movements of our fixed-rate instruments due to changes in benchmark interest. The interest rate swaps are entered into on a one-to-one basis to manage the benchmark interest rate risk, and its terms are critically matched to the specified fixed rate instruments.

We also use interest rate swaps in fair value hedges to manage interest rate risk from residential mortgage assets and funding liabilities. Our exposure from this portfolio changes with the origination of new loans, repayments of existing loans, and sale of securitized mortgages. Accordingly, we have adopted dynamic hedging for that portfolio, in which the hedge relationship is rebalanced on a more frequent basis, such as on a bi-weekly or on a monthly basis.

For cash flow hedges, we use interest rate swaps to manage the exposure to cash flow variability of our variable rate instruments as a result of changes in benchmark interest rates. The variable rate instruments and forecast transactions which reference certain IBORs will be affected by the Reform. Whilst some of the interest rate derivatives are entered into on a one-to-one basis to manage a specific exposure, other interest rate derivatives may be entered into for managing interest rate risks of a portfolio of assets and liabilities.

Foreign exchange risk

We manage our exposure to foreign currency risk with cross currency swaps in a cash flow hedge, and foreign exchange forward contracts in a net investment hedge. Certain cash instruments may also be designated in a net investment hedge, where applicable.

For cash flow hedges, we use cross currency swaps and forward contracts to manage the cash flow variability arising from fluctuations in foreign exchange rates on our issued foreign denominated fixed rate liabilities and highly probable forecasted transactions. The maturity profile and repayment terms of these swaps are matched to those of our foreign denominated exposures to limit our cash flow volatility from changes in foreign exchange rates.

For net investment hedges, we use a combination of foreign exchange forwards and cash instruments, such as foreign denominated deposit liabilities, some of which reference IBORs that will be affected by the Reform, to manage our foreign exchange risk arising from our investments in foreign operations. Our most significant exposures include USD, GBP and Euro. When hedging net investments in foreign operations using foreign exchange forwards, only the undiscounted spot element of the foreign exchange forward is designated as the hedging instrument. Accordingly, changes in the fair value of the hedging instrument as a result of changes in forward rates and the effects of discounting are not included in the hedging effectiveness assessment. Foreign operations are only hedged to the extent of the principal of the foreign denominated deposit liabilities or notional amount of the derivative; we generally do not expect to incur significant ineffectiveness on hedges of net investments in foreign operations.

Equity price risk

We use total return swaps in cash flow hedges to mitigate the cash flow variability of the expected payment associated with our cash settled share-based compensation plan for certain key employees by exchanging interest payments for indexed RBC share price change and dividend returns.

Credit risk

We predominantly use credit derivatives to economically hedge our credit exposures. We mitigate industry sector concentrations and single-name exposures related to our credit portfolio by purchasing credit derivatives to transfer credit risk to third parties.

Derivative instruments designated in hedging relationships

The following table presents the fair values of the derivative instruments and the principal amounts of the non-derivative liabilities, categorized by their hedging relationships, as well as derivatives that are not designated in hedging relationships.

Derivatives and non-derivative instruments (1)

	As at							
	October 31, 2022				October 31, 2021			
	Designated as hedging instruments in hedging relationships				Designated as hedging instruments in hedging relationships			
(Millions of Canadian dollars)	**Fair value**	**Cash flow**	**Net investment**	**Not designated in a hedging relationship**	Fair value	Cash flow	Net investment	Not designated in a hedging relationship
Assets								
Derivative instruments	**$ 247**	**$ 57**	**$ 36**	**$ 154,099**	$ 66	$ 9	$ 98	$ 95,368
Liabilities								
Derivative instruments	**27**	**–**	**126**	**153,338**	131	20	18	91,270
Non-derivative instruments	**–**	**–**	**25,798**	**n.a.**	–	–	27,157	n.a.

(1) The fair value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

n.a. not applicable

The following tables provide the remaining term to maturity analysis of the notional amounts and the weighted average rates of the hedging instruments and their carrying amounts by types of hedging relationships:

Fair value hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2022					
	Notional amounts				Carrying amount (1)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	**$ 9,083**	**$32,173**	**$ 15,516**	**$56,772**	**$ 247**	**$ 3**
Hedge of fixed rate liabilities	**13,231**	**69,419**	**10,094**	**92,744**	**–**	**24**
Weighted average fixed interest rate						
Hedge of fixed rate assets	**1.1%**	**2.5%**	**2.8%**	**2.3%**		
Hedge of fixed rate liabilities	**1.9%**	**1.8%**	**2.0%**	**1.9%**		

(Millions of Canadian dollars, except average rates)	As at October 31, 2021					
	Notional amounts				Carrying amount (1)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	$10,503	$25,008	$ 6,568	$42,079	$ 19	$ 116
Hedge of fixed rate liabilities	8,939	44,870	11,646	65,455	47	15
Weighted average fixed interest rate						
Hedge of fixed rate assets	0.8%	0.7%	1.9%	0.9%		
Hedge of fixed rate liabilities	1.5%	1.2%	1.5%	1.3%		

(1) The carrying value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

Cash flow hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2022					
	Notional amounts				Carrying amount (1)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of variable rate assets	**$ 50,436**	**$ 74,726**	**$ 1,023**	**$ 126,185**	**$ –**	**$ –**
Hedge of variable rate liabilities	**6,221**	**42,830**	**24,024**	**73,075**	**–**	**–**
Weighted average fixed interest rate						
Hedge of variable rate assets	**3.3%**	**2.8%**	**2.5%**	**3.0%**		
Hedge of variable rate liabilities	**2.0%**	**1.5%**	**2.0%**	**1.7%**		
Foreign exchange risk						
Cross currency swaps	**$ –**	**$ 314**	**$ –**	**$ 314**	**$ 32**	**$ –**
Weighted average CAD-EUR exchange rate	**n.a.**	**1.44**	**n.a.**	**1.44**		

(Millions of Canadian dollars, except average rates)	As at October 31, 2021					
	Notional amounts				Carrying amount (1)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of variable rate assets	$ 57,304	$ 28,707	$ 4,112	$ 90,123	$ –	$ –
Hedge of variable rate liabilities	16,659	55,556	13,784	85,999	–	–
Weighted average fixed interest rate						
Hedge of variable rate assets	0.5%	1.0%	1.2%	0.7%		
Hedge of variable rate liabilities	0.8%	1.2%	1.5%	1.2%		
Foreign exchange risk						
Cross currency swaps	$ –	$ 183	$ –	$ 183	$ 9	$ –
Weighted average CAD-EUR exchange rate	n.a.	1.52	n.a.	1.52		

(1) The carrying value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

n.a. not applicable

Note 9 Derivative financial instruments and hedging activities (continued)

Net investment hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2022 Notional/Principal: Within 1 year	1 through 5 years	Over 5 years	Total	Carrying amount: Assets	Liabilities
Foreign exchange risk						
Foreign currency liabilities	**$ 5,462**	**$ 20,851**	**$ 1,025**	**$ 27,338**	**n.a.**	**$ 25,798**
Weighted average CAD-USD exchange rate	**1.31**	**1.28**	**1.28**	**1.29**		
Weighted average CAD-EUR exchange rate	**–**	**1.51**	**1.48**	**1.51**		
Weighted average CAD-GBP exchange rate	**–**	**1.71**	**–**	**1.71**		
Forward contracts	**$ 6,089**	**$ –**	**$ –**	**$ 6,089**	**$ 36**	**$ 126**
Weighted average CAD-USD exchange rate	**1.34**	**n.a.**	**n.a.**	**1.34**		
Weighted average CAD-EUR exchange rate	**1.36**	**n.a.**	**n.a.**	**1.36**		
Weighted average CAD-GBP exchange rate	**1.55**	**n.a.**	**n.a.**	**1.55**		

(Millions of Canadian dollars, except average rates)	As at October 31, 2021 Notional/Principal: Within 1 year	1 through 5 years	Over 5 years	Total	Carrying amount: Assets	Liabilities
Foreign exchange risk						
Foreign currency liabilities	$ 433	$ 26,294	$ 401	$ 27,128	n.a.	$ 27,157
Weighted average CAD-USD exchange rate	1.32	1.29	1.30	1.29		
Weighted average CAD-EUR exchange rate	–	1.51	1.48	1.51		
Weighted average CAD-GBP exchange rate	–	1.72	–	1.72		
Forward contracts	$ 4,951	$ –	$ –	$ 4,951	$ 98	$ 18
Weighted average CAD-USD exchange rate	1.26	n.a.	n.a.	1.26		
Weighted average CAD-EUR exchange rate	1.45	n.a.	n.a.	1.45		
Weighted average CAD-GBP exchange rate	1.73	n.a.	n.a.	1.73		

n.a. not applicable

The following tables present the details of the hedged items categorized by their hedging relationships:

Fair value hedges – assets and liabilities designated as hedged items

(Millions of Canadian dollars)	As at and for the year ended October 31, 2022 Carrying amount: Assets	Liabilities	Accumulated amount of fair value adjustments on the hedged item included in the carrying amount: Assets	Liabilities	Balance sheet items:	Changes in fair values used for calculating hedge ineffectiveness
Interest rate risk						
Fixed rate assets (1)	**$52,216**	**$ –**	**$ (3,285)**	**$ –**	**Securities – Investment, net of applicable allowance; Loans – Retail; Loans – Wholesale**	**$ (3,695)**
Fixed rate liabilities (1)	**–**	**86,738**	**–**	**(5,924)**	**Deposits – Business and government; Subordinated debentures Deposits – Bank**	**5,742**

(Millions of Canadian dollars)	As at and for the year ended October 31, 2021 Carrying amount: Assets	Liabilities	Accumulated amount of fair value adjustments on the hedged item included in the carrying amount: Assets	Liabilities	Balance sheet items:	Changes in fair values used for calculating hedge ineffectiveness
Interest rate risk						
Fixed rate assets (1)	$42,810	$ –	$ (78)	$ –	Securities – Investment, net of applicable allowance; Loans – Retail; Loans – Wholesale	$ (1,027)
Fixed rate liabilities (1)	–	65,355	–	(59)	Deposits – Business and government; Subordinated debentures	1,842

(1) As at October 31, 2022, the accumulated amount of fair value hedge adjustments remaining in the Balance Sheet for hedged items that have ceased to be adjusted for hedging gains and losses is a loss of $36 million for fixed-rate assets and a loss of $25 million for fixed-rate liabilities (October 31, 2021 – gain of $25 million and loss of $62 million, respectively).

Cash flow and net investment hedges – assets and liabilities designated as hedged items

(Millions of Canadian dollars)	Balance sheet items:	Changes in fair values used for calculating hedge ineffectiveness	Cash flow hedge/foreign currency translation reserve	
			Continuing hedges	Discontinued hedges
Cash flow hedges				
Interest rate risk				
Variable rate assets	Securities – Investment, net of applicable allowance; Loans – Retail; Interest bearing deposits with banks; Asset purchased under reverse repurchase agreements and securities borrowed	$ 4,720	$ (1,777)	$ (2,668)
Variable rate liabilities	Deposits – Business and government; Deposits – Personal; Obligations related to assets sold under repurchase agreements and securities loaned	(6,895)	5,471	2,231
Foreign exchange risk				
Fixed rate assets	Securities – Investment, net of applicable allowance	(17)	7	–
Net investment hedges				
Foreign exchange risk				
Foreign subsidiaries	n.a.	1,927	(5,936)	(421)

(Millions of Canadian dollars)	Balance sheet items:	Changes in fair values used for calculating hedge ineffectiveness	Cash flow hedge/foreign currency translation reserve	
			Continuing hedges	Discontinued hedges
Cash flow hedges				
Interest rate risk				
Variable rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	$ 614	$ (402)	$ 206
Variable rate liabilities	Deposits – Business and government; Deposits – Personal	(2,641)	1,310	(399)
Foreign exchange risk				
Fixed rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	(98)	1	–
Net investment hedges				
Foreign exchange risk				
Foreign subsidiaries	n.a.	(2,331)	(4,032)	(421)

n.a. not applicable

Effectiveness of designated hedging relationships

(Millions of Canadian dollars)	For the year ended October 31, 2022			
	Change in fair value of hedging instrument	Hedge ineffectiveness recognized in income (1)	Changes in the value of the hedging instrument recognized in OCI	Amount reclassified from hedge reserves to income
Fair value hedges				
Interest rate risk				
Interest rate contracts – fixed rate assets	$ 3,650	$ (45)	n.a.	n.a.
Interest rate contracts – fixed rate liabilities	(5,713)	29	n.a.	n.a.
Cash flow hedges				
Interest rate risk				
Interest rate contracts – variable rate assets	(4,698)	(36)	$ (4,432)	$ (185)
Interest rate contracts – variable rate liabilities	6,713	37	6,673	(118)
Foreign exchange risk				
Cross currency swap – fixed rate assets	17	–	23	17
Net investment hedges				
Foreign exchange risk				
Foreign currency liabilities	(1,771)	(3)	(1,768)	–
Forward contracts	(159)	–	(159)	(23)

Note 9 Derivative financial instruments and hedging activities (continued)

(Millions of Canadian dollars)	For the year ended October 31, 2021			
	Change in fair value of hedging instrument	Hedge ineffectiveness recognized in income (1)	Changes in the value of the hedging instrument recognized in OCI	Amount reclassified from hedge reserves to income
Fair value hedges				
Interest rate risk				
Interest rate contracts – fixed rate assets	$ 929	$ (98)	n.a.	n.a.
Interest rate contracts – fixed rate liabilities	(1,802)	40	n.a.	n.a.
Cash flow hedges				
Interest rate risk				
Interest rate contracts – variable rate assets	(631)	(17)	$ (497)	$ 279
Interest rate contracts – variable rate liabilities	2,579	9	1,949	(1,024)
Foreign exchange risk				
Cross currency swap – fixed rate assets	98	–	98	103
Net investment hedges				
Foreign exchange risk				
Foreign currency liabilities	1,882	–	1,882	–
Forward contracts	449	–	449	1

(1) Hedge ineffectiveness recognized in income included losses of $19 million that are excluded from the assessment of hedge effectiveness and are offset by economic hedges (October 31, 2021 – $01 million).

n.a. not applicable

Reconciliation of components of equity

The following table provides a reconciliation by risk category of each component of equity and an analysis of other comprehensive income relating to hedge accounting:

(Millions of Canadian dollars)	For the year ended October 31, 2022		For the year ended October 31, 2021	
	Cash flow hedge reserve	**Foreign currency translation reserve**	Cash flow hedge reserve	Foreign currency translation reserve
Balance at the beginning of the year	**$ 566**	**$ 2,055**	$ (1,079)	$ 4,632
Cash flow hedges				
Effective portion of changes in fair value:				
Interest rate risk	**2,241**		1,452	
Foreign exchange risk	**23**		100	
Equity price risk	**(1)**		306	
Net amount reclassified to profit or loss:				
Ongoing hedges:				
Interest rate risk	**(227)**		505	
Foreign exchange risk	**(17)**		(105)	
Equity price risk	**(23)**		(271)	
De-designated hedges:				
Interest rate risk	**530**		240	
Hedges of net investment in foreign operations				
Foreign exchange denominated debt		**(1,768)**		1,882
Forward foreign exchange contracts		**(159)**		449
Foreign currency translation differences for foreign operations		**5,085**		(4,308)
Reclassification of losses (gains) on foreign currency translation to income		**(18)**		(7)
Reclassification of losses (gains) on net investment hedging activities to income		**23**		(1)
Tax on movements on reserves during the period	**(698)**	**470**	(582)	(592)
Balance at the end of the year	**$ 2,394**	**$ 5,688**	$ 566	$ 2,055

Note 10 Premises and equipment

(Millions of Canadian dollars)	Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Buildings	Equipment	Total
	For the year ended October 31, 2022								
	Owned by the Bank (1)						Right-of-use lease assets		
Cost									
Balance at beginning of period	**$ 145**	**$ 1,308**	**$ 1,126**	**$ 773**	**$ 2,754**	**$ 170**	**$ 5,394**	**$ 308**	**$11,978**
Additions	**–**	**–**	**24**	**3**	**28**	**397**	**270**	**138**	**860**
Acquisition through business combination	**–**	**–**	**4**	**1**	**6**	**1**	55	–	**67**
Transfers from work in process	**–**	**15**	**195**	**49**	**206**	**(465)**	**–**	**–**	**–**
Disposals	**(10)**	**(83)**	**(195)**	**(5)**	**(205)**	**(1)**	**(153)**	**(146)**	**(798)**
Foreign exchange translation	**7**	**24**	**17**	**15**	**67**	**6**	**58**	**(1)**	**193**
Other	**(1)**	**(3)**	**(2)**	**–**	**(11)**	**12**	**124**	**–**	**119**
Balance at end of period	**$ 141**	**$ 1,261**	**$ 1,169**	**$ 836**	**$ 2,845**	**$ 120**	**$ 5,748**	**$ 299**	**$12,419**
Accumulated depreciation									
Balance at beginning of period	**$ –**	**$ 664**	**$ 584**	**$ 427**	**$ 1,589**	**$ –**	**$ 1,133**	**$ 157**	**$ 4,554**
Depreciation	**–**	**48**	**234**	**94**	**233**	**–**	**569**	**87**	**1,265**
Disposals	**–**	**(80)**	**(192)**	**(4)**	**(204)**	**–**	**(106)**	**(146)**	**(732)**
Foreign exchange translation	**–**	**11**	**12**	**6**	**38**	**–**	**2**	**(1)**	**68**
Other	**–**	**(16)**	**2**	**2**	**–**	**–**	45	**17**	**50**
Balance at end of period	**$ –**	**$ 627**	**$ 640**	**$ 525**	**$ 1,656**	**$ –**	**$ 1,643**	**$ 114**	**$ 5,205**
Net carrying amount at end of period	**$ 141**	**$ 634**	**$ 529**	**$ 311**	**$ 1,189**	**$ 120**	**$ 4,105**	**$ 185**	**$ 7,214**

(Millions of Canadian dollars)	Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Buildings	Equipment (2)	Total
	For the year ended October 31, 2021								
	Owned by the Bank (1), (2)						Right–of–use lease assets		
Cost									
Balance at beginning of period	$ 152	$ 1,310	$ 1,150	$ 886	$ 2,675	$ 203	$ 5,171	$ 254	$11,801
Additions	1	–	28	6	94	388	379	109	1,005
Acquisition through business combination	–	–	–	–	–	–	–	–	–
Transfers from work in process	–	13	180	47	170	(410)	–	–	–
Disposals	(2)	(24)	(286)	(65)	(106)	(1)	(49)	(56)	(589)
Foreign exchange translation	(6)	(20)	(27)	(16)	(62)	(5)	(167)	1	(302)
Other	–	29	81	(85)	(17)	(5)	60	–	63
Balance at end of period	$ 145	$ 1,308	$ 1,126	$ 773	$ 2,754	$ 170	$ 5,394	$ 308	$11,978
Accumulated depreciation									
Balance at beginning of period	$ –	$ 648	$ 580	$ 467	$ 1,480	$ –	$ 584	$ 108	$ 3,867
Depreciation	–	49	245	94	222	–	578	88	1,276
Disposals	–	(12)	(284)	(64)	(92)	–	(5)	(40)	(497)
Foreign exchange translation	–	(9)	(16)	(7)	(31)	–	(24)	1	(86)
Other	–	(12)	59	(63)	10	–	–	–	(6)
Balance at end of period	$ –	$ 664	$ 584	$ 427	$ 1,589	$ –	$ 1,133	$ 157	$ 4,554
Net carrying amount at end of period	$ 145	$ 644	$ 542	$ 346	$ 1,165	$ 170	$ 4,261	$ 151	$ 7,424

(1) As at October 31, 2022, we had total contractual commitments of $85 million to purchase premises and equipment (October 31, 2021 – $62 million).

(2) Certain amounts have been revised from those previously presented.

Lease payments

Total lease payments for the year ended October 31, 2022 were $1,213 million, of which $578 million or 48% relates to variable payments and $635 million or 52% relates to fixed payments. Total lease payments for the year ended October 31, 2021 were $1,259 million, of which $613 million or 49% relates to variable payments and $646 million or 51% relates to fixed payments.

Total variable lease payments not included in the measurement of lease liabilities were $571 million for the year ended October 31, 2022 (October 31, 2021 – $603 million).

Note 11 Goodwill and other intangible assets

Goodwill

(Millions of Canadian dollars)	For the year ended October 31, 2022									
	Canadian Banking	**Caribbean Banking**	**Canadian Wealth Management**	**Global Asset Management**	**U.S. Wealth Management (including City National)**	**International Wealth Management**	**Insurance**	**Investor & Treasury Services**	**Capital Markets**	**Total**
Balance at beginning of period	**$ 2,557**	**$ 1,600**	**$ 577**	**$ 1,964**	**$ 2,768**	**$ 115**	**$ 112**	**$ 148**	**$1,013**	**$10,854**
Acquisitions	**17**	**–**	**–**	**33**	**–**	**880**	**–**	**–**	**–**	**930**
Dispositions	**–**	**–**	**–**	**–**	**(19)**	**–**	**–**	**–**	**–**	**(19)**
Currency translations	**–**	**159**	**12**	**(69)**	**278**	**47**	**–**	**(1)**	**86**	**512**
Balance at end of period	**$ 2,574**	**$ 1,759**	**$ 589**	**$ 1,928**	**$ 3,027**	**$ 1,042**	**$ 112**	**$ 147**	**$1,099**	**$12,277**

(Millions of Canadian dollars)	For the year ended October 31, 2021									
	Canadian Banking	Caribbean Banking	Canadian Wealth Management	Global Asset Management	U.S. Wealth Management (including City National)	International Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Total
Balance at beginning of period	$ 2,557	$ 1,719	$ 587	$ 2,001	$ 2,978	$ 121	$ 112	$ 149	$1,078	$11,302
Acquisitions	–	–	–	–	–	–	–	–	–	–
Dispositions	–	(3)	–	–	–	(4)	–	–	–	(7)
Currency translations	–	(116)	(10)	(37)	(210)	(2)	–	(1)	(65)	(441)
Balance at end of period	$ 2,557	$ 1,600	$ 577	$ 1,964	$ 2,768	$ 115	$ 112	$ 148	$1,013	$10,854

We perform our annual impairment test by comparing the carrying amount of each CGU to its recoverable amount. The recoverable amount of a CGU is represented by its VIU, except in circumstances where the carrying amount of a CGU exceeds its VIU. In such cases, the greater of the CGU's FVLCD and its VIU is the recoverable amount. Our annual impairment test is performed as at August 1. The impact of subsequent acquisitions has also been considered in our impairment test.

In our 2022 and 2021 annual impairment tests, the recoverable amounts of our Caribbean Banking and International Wealth Management CGUs were based on their FVLCD. The recoverable amounts of all other CGUs tested were based on their VIU.

Value in use

We calculate VIU using a five-year discounted cash flow method. Future cash flows are based on financial plans agreed by management, estimated based on forecast results, business initiatives, capital required to support future cash flows and returns to shareholders. Key drivers of future cash flows include net interest margins and average interest-earning assets. The values assigned to these drivers over the forecast period are based on past experience, external and internal economic forecasts, and management's expectations of the impact of economic conditions on our financial results. Beyond the initial cash flow projection period, cash flows are assumed to increase at a constant rate using a nominal long-term growth rate (terminal growth rate). Terminal growth rates are based on the long-term steady state growth expectations in the countries within which the CGU operates. The discount rates used to determine the present value of each CGU's projected future cash flows are based on the bank-wide cost of capital, adjusted for the risks to which each CGU is exposed. CGU-specific risks include: country risk, business/operational risk, geographic risk (including political risk, devaluation risk, and government regulation), currency risk, and price risk (including product pricing risk and inflation).

The estimation of VIU involves significant judgment in the determination of inputs to the discounted cash flow model and is most sensitive to changes in future cash flows, discount rates and terminal growth rates applied to cash flows beyond the forecast period. The sensitivity of the VIU to key inputs and assumptions used was tested by recalculating the recoverable amount using reasonably possible changes to those parameters. As at August 1, 2022, no reasonably possible change in an individual key input or assumption, as described, would result in a CGU's carrying amount exceeding its recoverable amount based on VIU.

The terminal growth rates and pre-tax discount rates used in our discounted cash flow models are summarized below.

	As at			
	August 1, 2022		August 1, 2021	
	Discount rate (1)	**Terminal growth rate**	Discount rate (1)	Terminal growth rate
Group of cash generating units				
Canadian Banking	**11.0%**	**3.0%**	9.4%	3.0%
Caribbean Banking	**12.6**	**3.5**	10.9	3.5
Canadian Wealth Management	**11.8**	**3.0**	10.5	3.0
Global Asset Management	**11.8**	**3.0**	10.5	3.0
U.S. Wealth Management (including City National)	**12.8**	**3.0**	11.1	3.0
International Wealth Management (2)	**n.m.**	**n.m.**	n.m.	n.m.
Insurance	**11.6**	**3.0**	10.2	3.0
Investor & Treasury Services	**11.8**	**3.0**	9.9	3.0
Capital Markets	**12.4**	**3.0**	11.8	3.0

(1) Pre-tax discount rates are determined implicitly based on post-tax discount rates.

(2) The recoverable amount for our International Wealth Management CGU is determined using a multiples-based approach.

n.m. not meaningful

Fair value less costs of disposal – Caribbean Banking

As at August 1, 2022, the recoverable amount of our Caribbean Banking CGU, based on FVLCD, was 109% of its carrying amount (August 1, 2021 – 123%). We calculated FVLCD using a discounted cash flow method that projects future cash flows over a5-year period. Cash flows are based on management forecasts, adjusted to approximate the considerations of a prospective third-party buyer. Cash flows beyond the initial 5-year period are assumed to increase at a constant rate using a nominal long-term growth rate. Future cash flows, terminal growth rates, and discount rates are based on the same factors noted above. The forecast future cash flows were discounted using a pre-tax rate of 12.6% (August 1, 2021 – 10.9%), reflecting a higher interest rate environment. This fair value measurement is categorized as level 3 in the fair value hierarchy as certain significant inputs are not observable. We use significant judgment to determine inputs to the discounted cash flow model, which is most sensitive to changes in future cash flows, discount rates and terminal growth rates.

We considered reasonably possible alternative scenarios, including market comparable transactions, which yielded valuations ranging from an immaterial deficit to an immaterial surplus. The sensitivity of the FVLCD to key inputs and assumptions was tested by recalculating the recoverable amount using reasonably possible change to those parameters. A 50 bps change in the terminal growth rate would increase and decrease the recoverable amount by $231 million and $203 million, respectively. A 50 bps increase in the discount rate would decrease the recoverable amount by $267 million. A reduction in the forecasted cash flows of 10% per annum would reduce the recoverable amount by $440 million. If future cash flows were reduced by 8%, the recoverable amount would approximate the carrying amount. Changes in these assumptions have been applied holding other individual factors constant. However, changes in one factor may be magnified or offset by related changes in other assumptions as impacts to the recoverable amount are highly interdependent and changes in assumptions may not have a linear effect on the recoverable amount of the CGU. In aggregate, the range of reasonably possible outcomes would not materially affect the recoverable amount of the CGU.

Other intangible assets

	For the year ended October 31, 2022					
(Millions of Canadian dollars)	**Internally generated software**	**Other software**	**Core deposit intangibles**	**Customer list and relationships**	**In process software**	**Total**
Gross carrying amount						
Balance at beginning of period	**$ 4,886**	**$ 894**	**$ 1,474**	**$ 1,414**	**$ 1,236**	**$ 9,904**
Additions	**25**	**16**	**–**	**–**	**1,256**	**1,297**
Acquisition through business combination	**–**	**14**	**–**	**1,292**	**148**	**1,454**
Transfers	**1,121**	**76**	**–**	**–**	**(1,197)**	**–**
Dispositions	**(960)**	**(111)**	**–**	**(329)**	**(5)**	**(1,405)**
Impairment losses	**(16)**	**–**	**–**	**–**	**(11)**	**(27)**
Currency translations	**71**	**48**	**149**	**113**	**30**	**411**
Other changes	**(51)**	**(29)**	**7**	**(18)**	**78**	**(13)**
Balance at end of period	**$ 5,076**	**$ 908**	**$ 1,630**	**$ 2,472**	**$ 1,535**	**$11,621**
Accumulated amortization						
Balance at beginning of period	**$ (2,979)**	**$ (572)**	**$ (885)**	**$ (997)**	**$ –**	**$ (5,433)**
Amortization charge for the year	**(976)**	**(137)**	**(153)**	**(103)**	**–**	**(1,369)**
Dispositions	**959**	**109**	**–**	**315**	**–**	**1,383**
Impairment losses	**9**	**–**	**–**	**–**	**–**	**9**
Currency translations	**(36)**	**(31)**	**(98)**	**13**	**–**	**(152)**
Other changes	**(8)**	**19**	**(10)**	**23**	**–**	**24**
Balance at end of period	**$ (3,031)**	**$ (612)**	**$ (1,146)**	**$ (749)**	**$ –**	**$ (5,538)**
Net balance at end of period	**$ 2,045**	**$ 296**	**$ 484**	**$ 1,723**	**$ 1,535**	**$ 6,083**

Note 11 Goodwill and other intangible assets (continued)

(Millions of Canadian dollars)	Internally generated software (1)	Other software (1)	Core deposit intangibles	Customer list and relationships (1)	In process software	Total
	For the year ended October 31, 2021					
Gross carrying amount						
Balance at beginning of period	$ 4,321	$ 1,031	$ 1,586	$ 1,493	$ 1,241	$ 9,672
Additions	48	15	–	–	1,129	1,192
Acquisition through business combination	–	–	–	–	–	–
Transfers	1,022	69	–	–	(1,091)	–
Dispositions	(258)	(186)	–	(43)	(8)	(495)
Impairment losses	(157)	–	–	–	(9)	(166)
Currency translations	(83)	(43)	(112)	(41)	(29)	(308)
Other changes	(7)	8	–	5	3	9
Balance at end of period	$ 4,886	$ 894	$ 1,474	$ 1,414	$ 1,236	$ 9,904
Accumulated amortization						
Balance at beginning of period	$ (2,529)	$ (630)	$ (793)	$ (968)	$ –	$(4,920)
Amortization charge for the year	(898)	(138)	(150)	(101)	–	(1,287)
Dispositions	257	185	–	43	–	485
Impairment losses	137	–	–	–	–	137
Currency translations	45	24	58	29	–	156
Other changes	9	(13)	–	–	–	(4)
Balance at end of period	$ (2,979)	$ (572)	$ (885)	$ (997)	$ –	$(5,433)
Net balance at end of period	$ 1,907	$ 322	$ 589	$ 417	$ 1,236	$ 4,471

(1) Certain amounts have been revised from those previously presented.

Note 12 Joint ventures and associated companies

The following table summarizes the carrying value of our interests in joint ventures and associated companies accounted for under the equity method as well as our share of the income of those entities.

(Millions of Canadian dollars)	Joint ventures		Associated companies	
	As at and for the year ended			
	October 31 2022	October 31 2021	**October 31 2022**	October 31 2021
Carrying amount	**$ 248**	$ 223	**$ 463**	$ 431
Share of:				
Net income	**$ 103**	$ 107	**$ 7**	$ 23

We do not have any joint ventures or associated companies that are individually material to our financial results.

Certain of our subsidiaries, joint ventures and associates are subject to regulatory requirements of the jurisdictions in which they operate. When these subsidiaries, joint ventures and associates are subject to such requirements, they may be restricted from transferring to us our share of their assets in the form of cash dividends, loans or advances. As at October 31, 2022, restricted net assets of these subsidiaries, joint ventures and associates were $44 billion (October 31, 2021 – $39 billion).

Note 13 Other assets

(Millions of Canadian dollars)	As at	
	October 31 2022	October 31 2021
Accounts receivable and prepaids	**$ 4,250**	$ 5,056
Accrued interest receivable	**4,703**	2,195
Cash collateral	**25,634**	14,541
Commodity trading receivables	**7,054**	6,996
Deferred income tax asset	**1,472**	2,011
Employee benefit assets	**3,331**	2,640
Insurance-related assets		
Collateral loans	**524**	615
Policy loans	**85**	87
Reinsurance assets	**1,084**	1,032
Other	**12**	62
Investments in joint ventures and associates	**711**	654
Margin deposits	**14,684**	11,441
Precious metals	**1,772**	1,619
Receivable from brokers, dealers and clients	**3,299**	3,395
Taxes receivable	**6,933**	4,891
Other	**4,752**	4,648
	$ 80,300	$ 61,883

Note 14 Deposits

(Millions of Canadian dollars)	As at October 31, 2022 Demand (1)	Notice (2)	Term (3)	Total	As at October 31, 2021 Demand (1)	Notice (2)	Term (3)	Total
Personal	$ 203,645	$ 64,743	$ 136,544	$ 404,932	$ 207,493	$ 64,613	$ 90,382	$ 362,488
Business and government	348,004	17,855	394,011	759,870	356,020	20,800	319,533	696,353
Bank	10,458	490	33,064	44,012	12,549	449	28,992	41,990
	$ 562,107	$ 83,088	$ 563,619	$ 1,208,814	$ 576,062	$ 85,862	$ 438,907	$ 1,100,831
Non-interest-bearing (4)								
Canada	$ 149,737	$ 7,797	$ 466	$ 158,000	$ 151,475	$ 8,051	$ 713	$ 160,239
United States	52,702	–	–	52,702	54,021	–	–	54,021
Europe (5)	620	–	–	620	632	–	–	632
Other International	7,840	–	–	7,840	8,002	–	–	8,002
Interest-bearing (4)								
Canada	305,779	17,982	409,586	733,347	315,464	19,857	312,987	648,308
United States	11,410	57,055	85,111	153,576	6,978	57,260	77,597	141,835
Europe (5)	28,276	254	52,144	80,674	34,278	693	36,788	71,759
Other International	5,743	–	16,312	22,055	5,212	1	10,822	16,035
	$ 562,107	$ 83,088	$ 563,619	$ 1,208,814	$ 576,062	$ 85,862	$ 438,907	$ 1,100,831

(1) Demand deposits are deposits for which we do not have the right to require notice of withdrawal, which include both savings and chequing accounts.

(2) Notice deposits are deposits for which we can legally require notice of withdrawal. These deposits are primarily savings accounts.

(3) Term deposits are deposits payable on a fixed date, and include term deposits, guaranteed investment certificates and similar instruments.

(4) The geographical splits of the deposits are based on the point of origin of the deposits and where the revenue is recognized. As at October 31, 2022, deposits denominated in U.S. dollars, British pounds, Euro and other foreign currencies were $465 billion, $35 billion, $50 billion and $80 billion, respectively (October 31, 2021 – $99 billion, $35 billion, $43 billion and $27 billion, respectively).

(5) Europe includes the United Kingdom, Luxembourg, the Channel Islands, France and Italy.

Contractual maturities of term deposits

(Millions of Canadian dollars)	As at October 31 2022	October 31 2021
Within 1 year:		
less than 3 months	$ 159,602	$ 133,776
3 to 6 months	61,996	64,062
6 to 12 months	156,531	83,871
1 to 2 years	49,225	45,532
2 to 3 years	42,809	29,204
3 to 4 years	27,609	24,573
4 to 5 years	33,835	25,329
Over 5 years	32,012	32,560
	$ 563,619	$ 438,907
Aggregate amount of term deposits in denominations of one hundred thousand dollars or more	$ 521,000	$ 416,000

Average deposit balances and average rates of interest

(Millions of Canadian dollars, except for percentage amounts)	For the year ended October 31, 2022 Average balances	Average rates	October 31, 2021 Average balances	Average rates
Canada	$ 847,052	1.02%	$ 772,875	0.61%
United States	207,436	0.50	180,230	0.13
Europe	81,824	1.03	77,217	0.55
Other International	28,613	0.72	28,731	0.33
	$ 1,164,925	0.92%	$ 1,059,053	0.51%

Note 15 Insurance

Risk management

Insurance risk is the risk of fluctuations in the timing, frequency or severity of insured events, relative to our expectations at the time of underwriting. We do not have a high degree of concentration risk due to our geographic diversity and business mix. Concentration risk is not a major concern for the life insurance business as it does not have a material level of region-specific characteristics. Reinsurance is also used for a majority of our Canadian insurance business to lower our risk profile and limit the liability on a single claim. We manage underwriting and pricing risk through the use of underwriting guidelines which detail the class, nature and type of business that may be accepted, pricing policies by product line and controls over policy wordings. The risk that claims are handled or paid inappropriately is mitigated by using a range of information technology (IT) system controls and manual processes conducted by experienced staff. These, together with a range of detailed policies and procedures, ensure that all claims are handled in a timely, appropriate and accurate manner.

Note 15 Insurance (continued)

Reinsurance ceded

In the ordinary course of business, our insurance operations reinsure risks to other insurance and reinsurance companies in order to lower our risk profile, limit loss exposure to large risks, and provide additional capacity for future growth. These ceding reinsurance arrangements do not relieve our insurance subsidiaries from our direct obligations to the insured parties. We evaluate the financial condition of the reinsurers and monitor our concentrations of credit risks to minimize our exposure to losses from reinsurer insolvency. Reinsurance amounts (ceded premiums) included in Non-interest income are shown in the table below.

Net premiums and claims

	For the year ended	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Gross premiums	**$ 4,913**	$ 5,090
Premiums ceded to reinsurers	**(260)**	(250)
Net premiums	**$ 4,653**	$ 4,840
Gross claims and benefits (1)	**$ 1,741**	$ 3,834
Reinsurers' share of claims and benefits	**(273)**	(287)
Net claims	**$ 1,468**	$ 3,547

(1) Includes the change in fair value of investments backing our policyholder liabilities.

Insurance claims and policy benefit liabilities

All actuarial assumptions are set in conjunction with Canadian Institute of Actuaries Standards of Practice and OSFI requirements. The assumptions that have the greatest effect on the measurement of insurance liabilities, the processes used to determine them and the assumptions used as at October 31, 2022 are as follows:

Mortality and morbidity – Mortality estimates are based on standard industry insured mortality tables, adjusted where appropriate to reflect our own experience. Morbidity assumptions are made with respect to the rates of claim incidence and claim termination for health insurance policies and are based on a combination of industry and our own experience.

Future investment yield – Assumptions are based on the current yield rate, a reinvestment assumption and an allowance for future credit losses for each line of business, and are developed using interest rate scenario testing, including prescribed scenarios for determination of minimum liabilities as set out in the actuarial standards.

Policyholder behaviour – Under certain policies, the policyholder has a contractual right to change benefits and premiums, as well as convert policies to permanent forms of insurance. All policyholders have the right to terminate their policies through lapse. Lapses represent the termination of policies due to non-payment of premiums. Lapse assumptions are primarily based on our recent experience adjusted for emerging industry experience where applicable.

Significant insurance assumptions

	As at	
	October 31 2022	October 31 2021
Life Insurance		
Canadian Insurance		
Mortality rates (1)	**0.11%**	0.12%
Morbidity rates (2)	**1.81**	1.78
Future reinvestment yield (3)	**3.75**	3.76
Lapse rates (4)	**0.50**	0.50
International Insurance		
Mortality rates (1)	**0.80**	0.79
Future reinvestment yield (3)	**2.90**	2.90

(1) Average annual death rate for the largest portfolio of insured policies.

(2) Average net termination rate for the individual and group disability insurance portfolio.

(3) Ultimate reinvestment rate of the insurance operations.

(4) Ultimate policy termination rate (lapse rate) for the largest permanent life insurance portfolio that relies on a higher termination rate to maintain its profitability (lapse-supported policies).

Insurance claims and policy benefit liabilities
The following table summarizes our gross and reinsurers' share of insurance liabilities at the end of the year.

	As at					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars)	**Gross**	**Ceded**	**Net**	Gross	Ceded	Net
Life insurance policyholder liabilities						
Life, health and annuity	**$ 11,481**	**$ 902**	**$ 10,579**	$ 12,775	$ 861	$ 11,914
Investment contracts (1)	**41**	**–**	**41**	42	–	42
	$ 11,522	**$ 902**	**$ 10,620**	$ 12,817	$ 861	$ 11,956
Non-life insurance policyholder liabilities						
Unearned premium provision (1)	**$ 7**	**$ –**	**$ 7**	$ 6	$ –	$ 6
Unpaid claims provision	**30**	**1**	**29**	41	3	38
	$ 37	**$ 1**	**$ 36**	$ 47	$ 3	$ 44
	$ 11,559	**$ 903**	**$ 10,656**	$ 12,864	$ 864	$ 12,000

(1) Liabilities for investment contracts and unearned premium provision are reported in Other liabilities on the Consolidated Balance Sheets.

Reconciliation of life insurance policyholder liabilities

	For the year ended					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars)	**Gross**	**Ceded**	**Net**	Gross	Ceded	Net
Balances at beginning of period	**$12,817**	**$ 861**	**$11,956**	$12,123	$ 752	$ 11,371
New and in-force policies (1)	**(1,288)**	**(130)**	**(1,158)**	775	108	667
Changes in assumption and methodology	**(6)**	**171**	**(177)**	(89)	1	(90)
Net change in investment contracts	**(1)**	**–**	**(1)**	8	–	8
Balances at end of period	**$11,522**	**$ 902**	**$10,620**	$12,817	$ 861	$ 11,956

(1) Includes the change in fair value of investments backing our policyholder liabilities.

The net decrease in life insurance claims and policy benefit liabilities over the prior year was primarily attributable to market movements on assets backing life insurance policyholder liabilities and asset and liability matching activities, partially offset by business growth. During the year, we reviewed all key actuarial methods and assumptions which are used in determining the policy benefit liabilities resulting in a $177 million net decrease to insurance liabilities comprised of: (i) a decrease of $225 million for revised actuarial reserves on interest rate risk; (ii) an increase of $9 million due to reinsurance contract renegotiations; (iii) an increase of $37 million arising from insurance risk related assumption updates largely due to mortality, morbidity, and expense assumptions; and (iv) an increase of $2 million due to changes to valuation models and related data.

Sensitivity analysis
The following table presents the sensitivity of the level of insurance policyholder liabilities disclosed in this note to reasonably possible changes in the actuarial assumptions used to calculate them. The percentage change in each variable is applied to a range of existing actuarial modelling assumptions to derive the possible impact on net income. The analyses are performed where a single assumption is changed while holding other assumptions constant, which is unlikely to occur in practice.

		Net income impact for the year ended	
(Millions of Canadian dollars, except for percentage amounts)	Change in variable	**October 31 2022**	October 31 2021
Increase in market interest rates (1)	1%	**$ (10)**	$ (14)
Decrease in market interest rates (1)	1	**5**	17
Increase in equity market values (2)	10	**6**	8
Decrease in equity market values (2)	10	**(10)**	(10)
Increase in maintenance expenses (3)	5	**(33)**	(37)
Life Insurance (3)			
Adverse change in annuitant mortality rates	2	**(166)**	(287)
Adverse change in assurance mortality rates	2	**(59)**	(67)
Adverse change in morbidity rates	5	**(181)**	(213)
Adverse change in lapse rates	10	**(199)**	(253)

(1) Sensitivities for market interest rates include the expected current period earnings impact of a 100 basis points shift in the yield curve by increasing the current reinvestment rates while holding the assumed ultimate rates constant. The sensitivity consists of both the impact on assumed reinvestment rates in the actuarial liabilities and any changes in fair value of assets and liabilities from the yield curve shift.
(2) Sensitivities to changes in equity market values are composed of the expected current period earnings impact from differences in the changes in fair value of the equity asset holdings and the partially offsetting impact on the actuarial liabilities.
(3) Sensitivities to changes in maintenance expenses and life insurance actuarial assumptions include the expected current period earnings impact from recognition of increased liabilities due to an adverse change in the given assumption over the lifetime of all in-force policies.

Note 16 Segregated funds

We offer certain individual variable insurance contracts that allow policyholders to invest in segregated funds. The investment returns on these funds are passed directly to the policyholders. Amounts invested are at the policyholders' risk, except where the policyholders have selected options providing maturity and death benefit guarantees. A liability for the guarantees is recorded in Insurance claims and policy benefit liabilities.

Segregated funds net assets are recorded at fair value. All of our segregated funds net assets are categorized as Level 1 in the fair value hierarchy. The fair value of the segregated funds liabilities is equal to the fair value of the segregated funds net assets. Segregated funds net assets and segregated funds liabilities are presented on separate lines on the Consolidated Balance Sheets. The following tables present the composition of net assets and the changes in net assets for the year.

Segregated funds net assets

	As at	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Cash	**$ 39**	$ 40
Investment in mutual funds	**2,598**	2,625
Other assets (liabilities), net	**1**	1
	$ 2,638	$ 2,666

Changes in net assets

	For the year ended	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Net assets at beginning of period	**$ 2,666**	$ 1,922
Additions (deductions):		
Deposits from policyholders	**859**	975
Net realized and unrealized gains (losses)	**(301)**	381
Interest and dividends	**56**	51
Payment to policyholders	**(573)**	(604)
Management and administrative fees	**(59)**	(59)
Net assets at end of period	**$ 2,638**	$ 2,666

Note 17 Employee benefits – Pension and other post-employment benefits

Plan characteristics

We sponsor a number of programs that provide pension and post-employment benefits to eligible employees. The majority of beneficiaries of the pension plans are located in Canada and other beneficiaries of the pension plans are primarily located in the U.S., the U.K. and the Caribbean. The pension arrangements including investment, plan benefits and funding decisions are governed by local pension committees or trustees, who are legally segregated from the Bank, or management. Significant plan changes require the approval of the Board of Directors.

Our defined benefit pension plans provide pension benefits based on years of service, contributions and average earnings at retirement. Our primary defined benefit pension plans are closed to new members. New employees are generally eligible to join defined contribution pension plans. The specific features of these plans vary by location. We also provide supplemental non-registered (non-qualified) pension plans for certain executives and senior management that are typically unfunded or partially funded.

Our defined contribution pension plans provide pension benefits based on accumulated employee and Bank contributions. The Bank contributions are based on a percentage of an employee's annual earnings and a portion of the Bank contribution may be dependent on the amount being contributed by the employee and their years of service.

Our primary other post-employment benefit plans provide health, dental, disability and life insurance coverage and cover a number of current and retired employees who are mainly located in Canada. These plans are unfunded unless required by legislation.

We measure our benefit obligations and pension assets as at October 31 each year. All plans are valued using the projected unit-credit method. We fund our registered defined benefit pension plans in accordance with actuarially determined amounts required to satisfy employee benefit obligations under current pension regulations. For our principal pension plan, the most recent funding actuarial valuation was completed on January 1, 2022, and the next valuation will be completed on January 1, 2023.

For the year ended October 31, 2022, total contributions to our pension plans (defined benefit and defined contribution plans) and other post-employment benefit plans were $427 million and $79 million (October 31, 2021 – $456 million and $75 million), respectively. For 2023, total contributions to our pension plans and other post-employment benefit plans are expected to be $341 million and $84 million, respectively.

Risks

By their design, the defined benefit pension and other post-employment benefit plans expose the Bank to various risks such as investment performance, reductions in discount rates used to value the obligations, increased longevity of plan members, future inflation levels impacting future salary increases as well as future increases in healthcare costs. These risks will reduce over time due to the membership closure of our primary defined benefit pension plans and migration to defined contribution pension plans.

The following table presents the financial position related to all of our material pension and other post-employment benefit plans worldwide, including executive retirement arrangements.

(Millions of Canadian dollars)	As at October 31, 2022 Defined benefit pension plans	October 31, 2022 Other post-employment benefit plans	October 31, 2021 Defined benefit pension plans	October 31, 2021 Other post-employment benefit plans
Canada				
Fair value of plan assets	**$ 14,310**	**$ –**	$ 16,698	$ –
Present value of defined benefit obligation	**11,271**	**1,387**	14,403	1,703
Net surplus (deficit)	**$ 3,039**	**$ (1,387)**	$ 2,295	$ (1,703)
International				
Fair value of plan assets	**$ 716**	**$ –**	$ 1,005	$ –
Present value of defined benefit obligation	**622**	**75**	912	77
Net surplus (deficit)	**$ 94**	**$ (75)**	$ 93	$ (77)
Total				
Fair value of plan assets	**$ 15,026**	**$ –**	$ 17,703	$ –
Present value of defined benefit obligation	**11,893**	**1,462**	15,315	1,780
Total net surplus (deficit)	**$ 3,133**	**$ (1,462)**	$ 2,388	$ (1,780)
Effect of asset ceiling	**(8)**	**–**	(6)	–
Total net surplus (deficit), net of effect of asset ceiling	**$ 3,125**	**$ (1,462)**	$ 2,382	$ (1,780)
Amounts recognized in our Consolidated Balance Sheets				
Employee benefit assets	**$ 3,331**	**$ –**	$ 2,640	$ –
Employee benefit liabilities	**(206)**	**(1,462)**	(258)	(1,780)
Total net surplus (deficit), net of effect of asset ceiling	**$ 3,125**	**$ (1,462)**	$ 2,382	$ (1,780)

The following table presents an analysis of the movement in the financial position related to all of our material pension and other post-employment benefit plans worldwide, including executive retirement arrangements.

(Millions of Canadian dollars)	As at or for the year ended October 31, 2022 Defined benefit pension plans (1)	October 31, 2022 Other post-employment benefit plans	October 31, 2021 Defined benefit pension plans (1)	October 31, 2021 Other post-employment benefit plans
Fair value of plan assets at beginning of period	**$ 17,703**	**$ –**	$ 16,024	$ –
Interest income	**580**	**–**	432	–
Remeasurements				
Return on plan assets (excluding interest income)	**(2,931)**	**–**	1,614	–
Change in foreign currency exchange rate	**(62)**	**–**	(21)	–
Contributions – Employer	**177**	**79**	221	75
Contributions – Plan participant	**45**	**20**	46	19
Payments	**(610)**	**(99)**	(594)	(94)
Payments – amount paid in respect of settlements	**3**	**–**	(2)	–
Business combinations/Disposals	**135**	**–**	(4)	–
Other	**(14)**	**–**	(13)	–
Fair value of plan assets at end of period	**$ 15,026**	**$ –**	$ 17,703	$ –
Benefit obligation at beginning of period	**$ 15,315**	**$ 1,780**	$ 16,351	$ 1,953
Current service costs	**308**	**42**	359	46
Past service costs	**(1)**	**2**	–	(1)
Gains and losses on settlements	**(3)**	**–**	2	–
Interest expense	**496**	**63**	439	57
Remeasurements				
Actuarial losses (gains) from demographic assumptions	**(2)**	**(1)**	–	(6)
Actuarial losses (gains) from financial assumptions	**(3,797)**	**(341)**	(1,253)	(184)
Actuarial losses (gains) from experience adjustments	**83**	**(9)**	(5)	(2)
Change in foreign currency exchange rate	**(47)**	**6**	(24)	(7)
Contributions – Plan participant	**45**	**20**	46	19
Payments	**(610)**	**(99)**	(594)	(94)
Payments – amount paid in respect of settlements	**3**	**–**	(2)	–
Business combinations/Disposals	**103**	**(1)**	(4)	(1)
Benefit obligation at end of period	**$ 11,893**	**$ 1,462**	$ 15,315	$ 1,780
Unfunded obligation	**$ 23**	**$ 1,462**	$ 26	$ 1,633
Wholly or partly funded obligation	**11,870**	**–**	15,289	147
Total benefit obligation	**$ 11,893**	**$ 1,462**	$ 15,315	$ 1,780

(1) For pension plans with funding deficits, the benefit obligations and fair value of plan assets as at October 31, 2022 were $23 million and $117 million, respectively (October 31, 2021 – $413 million and $155 million, respectively).

Note 17 Employee benefits – Pension and other post-employment benefits (continued)

Pension and other post-employment benefit expense

The following table presents the composition of our pension and other post-employment benefit expense related to our material pension and other post-employment benefit plans worldwide.

	For the year ended			
	Pension plans		Other post-employment benefit plans	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021	**October 31 2022**	October 31 2021
Current service costs	**$ 308**	$ 359	**$ 42**	$ 46
Past service costs	**(1)**	–	**2**	(1)
Gains and losses on settlements	**(3)**	2	**–**	–
Net interest expense (income)	**(84)**	7	**63**	57
Remeasurements of other long term benefits	**–**	–	**(26)**	(12)
Administrative expense	**14**	13	**–**	–
Defined benefit pension expense	**$ 234**	$ 381	**$ 81**	$ 90
Defined contribution pension expense	**250**	235	**–**	–
	$ 484	$ 616	**$ 81**	$ 90

Service costs for the year ended October 31, 2022 totalled $305 million (October 31, 2021 – $356 million) for pension plans in Canada and $2 million (October 31, 2021 – $3 million) for International plans. Net interest expense (income) for the year ended October 31, 2022 totalled $(83) million (October 31, 2021 – $7 million) for pension plans in Canada and $(1) million (October 31, 2021 – $nil) for International plans.

Pension and other post-employment benefit remeasurements

The following table presents the composition of our remeasurements recorded in OCI related to our material pension and other post-employment benefit plans worldwide.

	For the year ended			
	Defined benefit pension plans		Other post-employment benefit plans	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021	**October 31 2022**	October 31 2021
Actuarial (gains) losses:				
Changes in demographic assumptions	**$ (2)**	$ –	**$ (1)**	$ (6)
Changes in financial assumptions	**(3,797)**	(1,253)	**(319)**	(177)
Experience adjustments	**83**	(5)	**(5)**	3
Return on plan assets (excluding interest based on discount rate)	**2,931**	(1,614)	**–**	–
Change in asset ceiling (excluding interest income)	**2**	5	**–**	–
	$ (783)	$ (2,867)	**$ (325)**	$ (180)

Remeasurements recorded in OCI for the year ended October 31, 2022 were gains of $798 million (October 31, 2021 – gains of $2,819 million) for pension plans in Canada and losses of $15 million (October 31, 2021 – gains of $48 million) for International plans.

Investment policy and strategies

Defined benefit pension plan assets are invested prudently in order to meet our longer-term pension obligations. The pension plans' investment strategy is to hold a diversified mix of investments by asset class and geographic location in order to reduce investment-specific risk to the funded status while maximizing the expected returns to meet pension obligations. Investment of the plan's assets follows an asset/liability framework as investment is conducted with careful consideration of the pension obligation's sensitivity to interest rates and credit spreads which are key risk factors impacting the obligation's value. Factors taken into consideration in developing our asset mix include but are not limited to the following:

- the nature of the underlying benefit obligations, including the duration and term profile of the liabilities;
- the member demographics, including expectations for normal retirements, terminations, and deaths;
- the financial position of the pension plans;
- the diversification benefits obtained by the inclusion of multiple asset classes; and
- expected asset returns, including asset and liability correlations, along with liquidity requirements of the plan.

To implement our asset mix policy, we may invest in debt securities, equity securities, and alternative investments. Our holdings in certain investments, including common shares, debt securities rated lower than BBB and residential and commercial mortgages, cannot exceed a defined percentage of the market value of our defined benefit pension plan assets. We may use derivative instruments as either a synthetic investment to more efficiently replicate the performance of an underlying security, or as a hedge against financial risks within the plan. To manage our credit risk exposure, where derivative instruments are not centrally cleared, counterparties are required to meet minimum credit ratings and enter into collateral agreements.

Our defined benefit pension plan assets are primarily comprised of debt and equity securities and alternative investments. Our equity securities generally have unadjusted quoted market prices in an active market (Level 1) and our debt securities generally have quoted market prices for similar assets in an active market (Level 2). Alternative investments and other includes cash, hedge funds, and private fund investments including infrastructure equity, real estate leases and private debt and equity. In

the case of private fund investments, no quoted market prices are usually available (Level 2 or Level 3). These fund assets are either valued by an independent valuator or priced using observable market inputs.

During the year ended October 31, 2022, the management of defined benefit pension investments focused on increased allocation to risk reducing investments and strategies, improving diversification, while striving to maintain expected investment return. Over time, an increasing allocation to debt securities is being used to reduce asset/liability duration mismatch and hence variability of the plan's funded status due to interest rate movement. Longer maturity debt securities, given their price sensitivity to movements in interest rates, are considered to be a good economic hedge to risk associated with the plan's liabilities, which are discounted using predominantly long maturity bond interest rates as inputs.

Asset allocation of defined benefit pension plans (1), (2)

	As at					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars, except percentages)	**Fair value**	**Percentage of total plan assets**	**Quoted in active market** (3)	Fair value	Percentage of total plan assets	Quoted in active market (3)
Equity securities						
Domestic	**$ 1,469**	**10%**	**100%**	$ 1,879	11%	100%
Foreign	**2,799**	**19**	**100**	4,202	24	100
Debt securities						
Domestic government bonds (4)	**3,489**	**23**	**–**	3,766	21	–
Foreign government bonds	**114**	**1**	**–**	71	–	–
Corporate and other bonds	**3,171**	**21**	**–**	3,844	22	–
Alternative investments and other	**3,984**	**26**	**8**	3,941	22	12
	$ 15,026	**100%**	**30%**	$ 17,703	100%	37%

(1) The asset allocation is based on the underlying investments held directly and indirectly through the funds as this is how we manage our investment policy and strategies.

(2) Represents the total plan assets held in our Canadian and International pension plans.

(3) If our assessment of whether or not an asset was quoted in an active market was based on direct investments34% of our total plan assets would be classified as quoted in an active market (October 31, 2021 -41%).

(4) Amounts are net of securities sold under repurchase agreements.

As at October 31, 2022, the plan assets include 0.7 million (October 31, 2021 – 1.0 million) of our common shares with a fair value of $89 million (October 31, 2021 – $128 million) and $48 million (October 31, 2021 – $29 million) of our debt securities. For the year ended October 31, 2022, dividends received on our common shares held in the plan assets were $4 million (October 31, 2021 – $4 million).

Maturity profile

The following table presents the maturity profile of our defined benefit pension plan obligation.

	As at October 31, 2022		
(Millions of Canadian dollars, except participants and years)	**Canada**	**International**	**Total**
Number of plan participants	**66,616**	**6,043**	**72,659**
Actual benefit payments 2022	**$ 585**	**$ 22**	**$ 607**
Benefits expected to be paid 2023	**643**	**35**	**678**
Benefits expected to be paid 2024	**668**	**34**	**702**
Benefits expected to be paid 2025	**691**	**33**	**724**
Benefits expected to be paid 2026	**713**	**35**	**748**
Benefits expected to be paid 2027	**733**	**34**	**767**
Benefits expected to be paid 2028-2032	**3,907**	**189**	**4,096**
Weighted average duration of defined benefit payments	**12.4 years**	**15.1 years**	**12.5 years**

Significant assumptions

Our methodologies to determine significant assumptions used in calculating the defined benefit pension and other post-employment benefit expense are as follows:

Discount rate

For the Canadian pension and other post-employment benefit plans, all future expected benefit payments at each measurement date are discounted at spot rates from a derived Canadian AA corporate bond yield curve. The derived curve is based on actual short and mid-maturity corporate AA rates and extrapolated longer term rates. The extrapolated corporate AA rates are derived from observed corporate A, corporate AA and provincial AA yields. For the International pension and other post-employment benefit plans, all future expected benefit payments at each measurement date are discounted at spot rates from a local AA corporate bond yield curve. Spot rates beyond 30 years are set to equal the 30-year spot rate. The discount rate is the equivalent single rate that produces the same discounted value as that determined using the entire discount curve. This valuation methodology does not rely on assumptions regarding reinvestment returns.

Note 17 Employee benefits – Pension and other post-employment benefits (continued)

Rate of increase in future compensation
The assumptions for increases in future compensation are developed separately for each plan, where relevant. Each assumption is set based on the price inflation assumption and compensation policies in each market, as well as relevant local statutory and plan-specific requirements.

Healthcare cost trend rates
Healthcare cost calculations are based on both short and long term trend assumptions established using the plan's recent experience as well as market expectations.

Weighted average assumptions to determine benefit obligation

	As at			
	Defined benefit pension plans		Other post-employment benefit plans	
	October 31 2022	October 31 2021	**October 31 2022**	October 31 2021
Discount rate	**5.4%**	3.3%	**5.5%**	3.6%
Rate of increase in future compensation	**3.0%**	3.0%	**n.a.**	n.a.
Healthcare cost trend rates (1)				
– Medical	**n.a.**	n.a.	**3.5%**	3.4%
– Dental	**n.a.**	n.a.	**3.1%**	3.1%

(1) For our other post-employment benefit plans, the assumed trend rates used to measure the expected benefit costs of the defined benefit obligations are also the ultimate trend rates.

n.a. not applicable

Mortality assumptions
Mortality assumptions are significant in measuring our obligations under the defined benefit pension plans. These assumptions have been set based on country specific statistics. Future longevity improvements have been considered and included where appropriate. The following table summarizes the mortality assumptions used for material plans.

	As at							
	October 31, 2022				October 31, 2021			
	Life expectancy at 65 for a member currently at				Life expectancy at 65 for a member currently at			
	Age 65		**Age 45**		Age 65		Age 45	
(In years)	**Male**	**Female**	**Male**	**Female**	Male	Female	Male	Female
Country								
Canada	**23.9**	**24.2**	**24.8**	**25.1**	23.8	24.2	24.8	25.1
United Kingdom	**23.4**	**25.4**	**24.7**	**26.8**	23.6	25.4	25.3	27.2

Sensitivity analysis
Assumptions adopted can have a significant effect on the value of the obligations for defined benefit pension and other post-employment benefit plans and are based on historical experience and market inputs. The increase (decrease) in obligation in the following table has been determined for key assumptions assuming all other assumptions are held constant. In practice, this is unlikely to occur, as changes in some of the assumptions may be correlated. The following table presents the sensitivity analysis of key assumptions for 2022.

	Increase (decrease) in obligation	
(Millions of Canadian dollars)	**Defined benefit pension plans**	**Other post-employment benefit plans**
Discount rate		
Impact of 100 bps increase in discount rate	**$ (1,348)**	**$ (160)**
Impact of 100 bps decrease in discount rate	**1,649**	**198**
Rate of increase in future compensation		
Impact of 50 bps increase in rate of increase in future compensation	**29**	**–**
Impact of 50 bps decrease in rate of increase in future compensation	**(31)**	**–**
Mortality rate		
Impact of an increase in longevity by one additional year	**287**	**20**
Healthcare cost trend rate		
Impact of 100 bps increase in healthcare cost trend rate	**n.a.**	**57**
Impact of 100 bps decrease in healthcare cost trend rate	**n.a.**	**(48)**

n.a. not applicable

Note 18 Other liabilities

(Millions of Canadian dollars)	As at October 31 2022	October 31 2021
Accounts payable and accrued expenses	**$ 1,292**	$ 1,867
Accrued interest payable	**5,019**	2,178
Cash collateral	**26,143**	16,712
Commodity liabilities	**10,038**	7,916
Deferred income	**3,660**	3,518
Deferred income taxes	**439**	74
Dividends payable	**1,856**	1,622
Employee benefit liabilities	**1,668**	2,038
Insurance related liabilities	**324**	366
Lease liabilities	**5,110**	5,077
Negotiable instruments	**1,715**	1,774
Payable to brokers, dealers and clients	**10,974**	6,461
Payroll and related compensation	**8,991**	9,340
Precious metals certificates	**557**	613
Provisions	**627**	601
Short-term borrowings of subsidiaries	**9,609**	–
Taxes payable	**2,136**	3,403
Other	**5,077**	6,741
	$ 95,235	$ 70,301

Note 19 Subordinated debentures

The debentures are unsecured obligations and are subordinated in right of payment to the claims of depositors and certain other creditors. The amounts presented below are net of our own holdings in these debentures, and include the impact of fair value hedges used for managing interest rate risk.

(Millions of Canadian dollars, except percentage and foreign currency) Maturity	Earliest par value redemption date	Interest rate	Denominated in foreign currency (millions)	As at October 31 2022	October 31 2021
July 15, 2022 (1)		5.38%	US$150	**$ –**	$ 188
June 8, 2023		9.30%		**110**	110
January 27, 2026 (2)		4.65%	US$1,500	**1,884**	1,916
November 1, 2027 (3)	November 1, 2022	4.75%	TT$300	**60**	55
July 25, 2029 (2)	July 25, 2024	2.74% (4)		**1,415**	1,499
December 23, 2029 (2)	December 23, 2024	2.88% (5)		**1,412**	1,489
June 30, 2030 (2)	June 30, 2025	2.09% (6)		**1,250**	1,250
November 3, 2031 (2)	November 3, 2026	2.14% (7)		**1,637**	1,717
May 3, 2032 (2)	May 3, 2027	2.94% (8)		**932**	–
January 28, 2033 (2)	January 28, 2028	1.67% (9)		**875**	943
October 1, 2083	Any interest payment date	(10)		**224**	224
June 29, 2085	Any interest payment date	(11)	US$174	**237**	215
				$ 10,036	$ 9,606
Deferred financing costs				**(11)**	(13)
				$ 10,025	$ 9,593

(1) On July 15, 2022, all US$150 million of outstanding 5.38% subordinated debentures matured.

(2) The notes include NVCC provisions, necessary for the notes to qualify as Tier 2 regulatory capital under Basel III. NVCC provisions require the conversion of the instrument into a variable number of common shares in the event that OSFI deems the Bank non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. In such an event, each note is convertible into common shares pursuant to an automatic conversion formula with a multiplier of 1.5 and a conversion price based on the greater of: (i) a floor price of $5.00 and (ii) the current market price of our common shares based on the volume weighted average trading price of our common shares on the Toronto Stock Exchange. The number of shares issued is determined by dividing the par value of the note (including accrued and unpaid interest on such note) by the conversion price and then times the multiplier.

(3) On November 1, 2022, we redeemed all TT$300 million of outstanding 4.75% subordinated debentures due on November 1, 2027 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date.

(4) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.98% above the 3-month CDOR.

(5) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.89% above the 3-month CDOR.

(6) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.31% above the 3-month CDOR.

(7) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.61% above the 3-month CDOR.

(8) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.76% above the 3-month CDOR.

(9) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.55% above the 3-month CDOR.

(10) Interest at a rate of 0.40% above the 30-day Bankers' Acceptance rate.

(11) Interest at a rate of 0.25% above the U.S. dollar 3-month London Interbank Mean Rate (LIMEAN). In the event of a reduction of the annual dividend we declare on our common shares, the interest payable on the debentures is reduced pro rata to the dividend reduction and the interest reduction is payable with the proceeds from the sale of newly issued common shares.

All redemptions, cancellations and exchanges of subordinated debentures are subject to the consent and approval of OSFI.

Maturity schedule

The aggregate maturities of subordinated debentures, based on the maturity dates under the terms of issue, are as follows:

(Millions of Canadian dollars)	As at October 31 2022
Within 1 year	**$ 110**
1 to 5 years	**1,884**
5 to 10 years	**6,706**
Thereafter	**1,336**
	$ 10,036

Note 20 Equity

Share capital

Authorized share capital

Preferred – An unlimited number of First Preferred Shares and Second Preferred Shares without nominal or par value, issuable in series; the aggregate consideration for which all the First Preferred Shares and all the Second Preferred Shares that may be issued may not exceed $20 billion and $5 billion, respectively.

Common – An unlimited number of shares without nominal or par value may be issued.

Outstanding share capital

The following table details our common and preferred shares and other equity instruments outstanding.

	As at and for the year ended					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars, except the number of shares and as otherwise noted)	Number of shares (thousands)	Amount	Dividends declared per share	Number of shares (thousands)	Amount	Dividends declared per share
Common shares issued						
Balance at beginning of period	**1,425,187**	**$ 17,728**		1,423,861	$ 17,628	
Issued in connection with share-based compensation plans (1)	**1,270**	**99**		1,326	100	
Purchased for cancellation (2)	**(40,866)**	**(509)**		–	–	
Balance at end of period	**1,385,591**	**$ 17,318**	**$ 4.96**	1,425,187	$ 17,728	$ 4.32
Treasury – common shares						
Balance at beginning of period (3)	**(662)**	**$ (73)**		(1,388)	$ (129)	
Purchases	**(48,437)**	**(5,183)**		(37,603)	(4,060)	
Sales	**46,419**	**4,922**		38,329	4,116	
Balance at end of period (3)	**(2,680)**	**$ (334)**		(662)	$ (73)	
Common shares outstanding	**1,382,911**	**$ 16,984**		1,424,525	$ 17,655	
Preferred shares and other equity instruments issued						
First preferred (4)						
Non-cumulative, fixed rate						
Series BH	**6,000**	**$ 150**	**$ 1.23**	6,000	$ 150	$ 1.23
Series BI	**6,000**	**150**	**1.23**	6,000	150	1.23
Series BJ (5)	**–**	**–**	**0.33**	6,000	150	1.31
Non-cumulative, 5-Year Rate Reset						
Series AZ	**20,000**	**500**	**0.93**	20,000	500	0.93
Series BB	**20,000**	**500**	**0.91**	20,000	500	0.91
Series BD	**24,000**	**600**	**0.80**	24,000	600	0.80
Series BF	**12,000**	**300**	**0.75**	12,000	300	0.75
Series BO	**14,000**	**350**	**1.20**	14,000	350	1.20
Series BT (6)	**750**	**750**	**4.20%**	–	–	–
Non-cumulative, fixed rate/floating rate						
Series C-2	**15**	**23**	**US$ 67.50**	15	23	US$ 67.50
Other equity instruments						
Limited recourse capital notes (LRCNs) (7)						
Series 1 (8)	**1,750**	**1,750**	**4.50%**	1,750	1,750	4.50%
Series 2 (8)	**1,250**	**1,250**	**4.00%**	1,250	1,250	4.00%
Series 3 (8)	**1,000**	**1,000**	**3.65%**	1,000	1,000	3.65%
	106,765	**$ 7,323**		112,015	$ 6,723	
Treasury – preferred shares and other equity instruments						
Balance at beginning of period (3)	**(164)**	**$ (39)**		(2)	$ (3)	
Purchases	**(2,811)**	**(518)**		(6,306)	(683)	
Sales	**2,963**	**552**		6,144	647	
Balance at end of period (3)	**(12)**	**$ (5)**		(164)	$ (39)	
Preferred shares and other equity instruments outstanding	**106,753**	**$ 7,318**		111,851	$ 6,684	

(1) Includes fair value adjustments to stock options of $6 million (October 31, 2021 – $1 million).

(2) During the year ended October 31, 2022, we purchased common shares for cancellation at an average cost of $132.80 per share with a book value of $12.47 per share. During the year ended October 31, 2021, we did not purchase for cancellation any common shares.

(3) Positive amounts represent a short position and negative amounts represent a long position.

(4) First Preferred Shares were issued at $25 per share with the exception of Non-Cumulative 5-Year Rate Reset First Preferred Shares Series BT (Series BT) and Non-Cumulative Fixed Rate/Floating Rate First Preferred Shares Series C-2 (Series C-2) which were issued at $1,000 and US$1,000 per share (equivalent to US$25 per depositary share), respectively.

(5) On February 24, 2022, we redeemed all 6 million of our issued and outstanding Non-Cumulative Fixed Rate First Preferred Shares Series BJ at a price of $25.75 per share.

(6) On November 5, 2021, we issued 750 thousand Non-Cumulative 5-Year Rate Reset First Preferred Shares Series BT, totalling $750 million.

(7) Each series of LRCNs (LRCN Series) were issued at a $1,000 per note. The number of shares represent the number of notes issued and the dividends declared per share represent the annual interest rate percentage applicable to the notes issued as at the reporting date.

(8) In connection with the issuance of LRCN Series 1, we issued $1,750 million of Non-Cumulative 5-Year Rate Reset First Preferred Shares Series BQ (Series BQ); in connection with the issuance of LRCN Series 2, we issued $1,250 million of Non-Cumulative 5-Year Rate Reset First Preferred Shares Series BR (Series BR); in connection with the issuance of LRCN Series 3, we issued $1,000 million of Non-Cumulative 5-Year Rate Reset First Preferred Shares Series BS (Series BS). The Series BQ, BR and BS preferred shares were issued at a price of $1,000 per share and were issued to a consolidated trust to be held as trust assets in connection with each respective LRCN Series.

Significant terms and conditions of preferred shares and other equity instruments

As at October 31, 2022	Current annual yield	Premium	Current dividend per share (1)	Earliest redemption date (2)	Issue date	Redemption price (2), (3)
Preferred shares						
First preferred						
Non-cumulative, fixed rate						
Series BH (4)	4.90%		$ .306250	November 24, 2020	June 5, 2015	$ 26.00
Series BI (4)	4.90%		.306250	November 24, 2020	July 22, 2015	26.00
Non-cumulative, 5-Year Rate Reset (5)						
Series AZ (4)	3.70%	2.21%	.231250	May 24, 2019	January 30, 2014	25.00
Series BB (4)	3.65%	2.26%	.228125	August 24, 2019	June 3, 2014	25.00
Series BD (4)	3.20%	2.74%	.200000	May 24, 2020	January 30, 2015	25.00
Series BF (4)	3.60%	2.62%	.187500	November 24, 2020	March 13, 2015	25.00
Series BO (4)	4.80%	2.38%	.300000	February 24, 2024	November 2, 2018	25.00
Series BT (4)	4.20%	2.71%	21.000000	February 24, 2027	November 5, 2021	1,000.00
Non-cumulative, fixed rate/floating rate						
Series C-2 (6)	6.75%	4.052%	US$16.875000	November 7, 2023	November 2, 2015	US$ 1,000.00
Other equity instruments						
Limited recourse capital notes (7)						
Series 1 (8)	4.50%	4.137%	n.a.	October 24, 2025	July 28, 2020	$ 1,000.00
Series 2 (9)	4.00%	3.617%	n.a.	January 24, 2026	November 2, 2020	1,000.00
Series 3 (10)	3.65%	2.665%	n.a.	October 24, 2026	June 8, 2021	1,000.00

(1) With the exception of Series BT, non-cumulative preferential dividends of each Series are payable quarterly, as and when declared by the Board of Directors, on or about the 24th day (7th day for Series C-2) of February, May, August and November. In the case of Series BT, non-cumulative preferential dividends are payable semi-annually, as and when declared by the Board of Directors.

(2) Subject to the consent of OSFI and the requirements of the Bank Act (Canada), we may, on or after the dates specified above, redeem First Preferred Shares. In the case of Series AZ, BB, BD, BF, and BO, these may be redeemed for cash at a price per share of $25 if redeemed on the earliest redemption date and on the same date every fifth year thereafter. In the case of BH and BI, these may be redeemed for cash at a price per share of $26 if redeemed during the 12 months commencing on the earliest redemption date and decreasing by $0.25 each 12-month period thereafter to a price per share of $25 if redeemed four years from the earliest redemption date or thereafter. Series BT may be redeemed for cash at a price per share of $1,000 if redeemed on the earliest redemption date and on the same date every fifth year thereafter. Series C-2 may be redeemed at a price of US$1,000 on the earliest redemption date and any dividend payment date thereafter.

(3) Subject to the consent of OSFI and the requirements of the Bank Act (Canada), we may purchase the First Preferred Shares of each Series for cancellation at the lowest price or prices at which, in the opinion of the Board of Directors, such shares are obtainable.

(4) The preferred shares include NVCC provisions, necessary for the shares to qualify as Tier 1 regulatory capital under Basel III. NVCC provisions require the conversion of the instrument into a variable number of common shares in the event that OSFI deems the Bank non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. In such an event, each preferred share is convertible into common shares pursuant to an automatic conversion formula with a multiplier of 1 and with a conversion price based on the greater of: (i) a floor price of $5 and (ii) the current market price of our common shares based on the volume weighted average trading price of our common shares on the Toronto Stock Exchange. The number of shares issued is determined by dividing the preferred share value by the conversion price.

(5) The dividend rate will reset on the earliest redemption date and every fifth year thereafter at a rate equal to the 5-year Government of Canada bond yield plus the premium indicated. The holders have the option to convert their shares into non-cumulative floating rate First Preferred Shares subject to certain conditions on the earliest redemption date and every fifth year thereafter at a rate equal to the three-month Government of Canada Treasury Bill rate plus the premium indicated.

(6) The dividend rate will change on the earliest redemption date at a rate equal to the 3-month LIBOR plus the premium indicated. Series C-2 do not qualify as Tier 1 regulatory capital.

(7) The current annual yield on each LRCN Series represents the annual interest rate applicable to the notes issued as at the reporting date. The payments of interest and principal in cash on the LRCN Series are made at our discretion, and non-payment of interest and principal in cash does not constitute an event of default. In the event of (i) non-payment of interest on any interest payment date, (ii) non-payment of the redemption price in case of a redemption of a LRCN Series, (iii) non-payment of principal at the maturity of a LRCN Series, or (iv) an event of default on a LRCN Series, holders of such LRCN Series will have recourse only to the assets (Trust Assets) held by a third-party trustee in a consolidated trust in respect of such LRCN Series and each such noteholder will be entitled to receive its pro rata share of the Trust Assets. In such an event, the delivery of the Trust Assets for each LRCN Series will represent the full and complete extinguishment of our obligations under the related LRCN Series. The LRCNs include NVCC provisions, necessary for the shares to qualify as Tier 1 regulatory capital under Basel III. NVCC provisions require the conversion of the instrument into a variable number of common shares in the event that OSFI deems the Bank non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. In such an event, each note is automatically redeemed and the redemption price will be satisfied by the delivery of Trust Assets, which will consist of common shares pursuant to an automatic conversion of the series of preferred shares that were issued concurrently with the related LRCN Series. Each series of preferred shares include an automatic conversion formula with a conversion price based on the greater of: (i) a floor price of $5 and (ii) the current market price of our common shares based on the volume weighted average trading price of our common shares on the Toronto Stock Exchange. The number of common shares issued in respect of each series of preferred shares will be determined by dividing the preferred share value ($1,000 plus declared and unpaid dividends) by the conversion price. The number of common shares delivered to each noteholder will be based on such noteholder's pro rata interest in the Trust Assets. Subject to the consent of OSFI, we may purchase LRCNs for cancellation at such price or prices and upon such terms and conditions as we in our absolute discretion may determine, subject to any applicable law restricting the purchase of notes.

(8) LRCN Series 1 bear interest at a fixed rate of 4.5% per annum until November 24, 2025, and thereafter at a rate per annum, reset every fifth year, equal to the 5-Year Government of Canada Yield plus 4.137% until maturity on November 24, 2080. The interest is paid semi-annually on or about the 24th day of May and November. LRCN Series 1 is redeemable during the period from October 24 to and including November 24, commencing in 2025 and every fifth year thereafter to the extent we redeem Series BQ pursuant to their terms and subject to the consent of OSFI and requirements of the Bank Act (Canada).

(9) LRCN Series 2 bear interest at a fixed rate of 4.0% per annum until February 24, 2026, and thereafter at a rate per annum, reset every fifth year, equal to the 5-Year Government of Canada Yield plus 3.617% until maturity on February 24, 2081. The interest is paid semi-annually on or about the 24th day of February and August. LRCN Series 2 is redeemable during the period from January 24 to and including February 24, commencing in 2026 and every fifth year thereafter to the extent we redeem Series BR pursuant to their terms and subject to the consent of OSFI and requirements of the Bank Act (Canada).

(10) LRCN Series 3 bear interest at a fixed rate of 3.65% per annum until November 24, 2026, and thereafter at a rate per annum, reset every fifth year, equal to the 5-Year Government of Canada Yield plus 2.665% until maturity on November 24, 2081. The interest is paid semi-annually on or about the 24th day of May and November. LRCN Series 3 is redeemable during the period from October 24 to and including November 24, commencing in 2026 and every fifth year thereafter to the extent we redeem Series BS pursuant to their terms and subject to the consent of OSFI and requirements of the Bank Act (Canada).

n.a. not applicable

Note 20 Equity (continued)

Restrictions on the payment of dividends

We are prohibited by the Bank Act (Canada) from declaring any dividends on our preferred or common shares when we are, or would be placed as a result of the declaration, in contravention of the capital adequacy and liquidity regulations or any regulatory directives issued under the Act. We may not pay dividends on our common shares at any time unless all dividends to which preferred shareholders are then entitled have been declared and paid or set apart for payment.

Currently, these limitations do not restrict the payment of dividends on our preferred or common shares.

Dividend reinvestment plan

Our dividend reinvestment plan (DRIP) provides common and preferred shareholders with a means to receive additional common shares rather than cash dividends. The plan is only open to shareholders residing in Canada or the U.S. The requirements of our DRIP are satisfied through either open market share purchases or shares issued from treasury. During 2022 and 2021, the requirements of our DRIP were satisfied through open market share purchases.

Shares available for future issuances

As at October 31, 2022, 42.7 million common shares are available for future issue relating to our DRIP and potential exercise of stock options and awards outstanding. In addition, we may issue up to 38.9 million common shares from treasury under the RBC Umbrella Savings and Securities Purchase Plan that was approved by shareholders on February 26, 2009.

Note 21 Share-based compensation

Stock option plans

We have stock option plans for certain key employees. Under the plans, options are periodically granted to purchase common shares. The exercise price for the majority of the grants is determined as the higher of the volume-weighted average of the trading prices per board lot (100 shares) of our common shares on the Toronto Stock Exchange (i) on the day preceding the day of grant; and (ii) the five consecutive trading days immediately preceding the day of grant. The exercise price for the remaining grants is the closing market share price of our common shares on the New York Stock Exchange on the date of grant. All options vest over a four-year period, and are exercisable for a period not exceeding 10 years from the grant date.

The compensation expense recorded for the year ended October 31, 2022, in respect of the stock option plans was $8 million (October 31, 2021 – $6 million). The compensation expense related to non-vested options was $4 million at October 31, 2022 (October 31, 2021 – $3 million), to be recognized over the weighted average period of 2.0 years (October 31, 2021 – 2.0 years).

Analysis of the movement in the number and weighted average exercise price of options is set out below:

A summary of our stock option activity and related information

	For the year ended			
	October 31, 2022		October 31, 2021	
(Canadian dollars per share except share amounts)	**Number of options (thousands)**	**Weighted average exercise price (1)**	Number of options (thousands)	Weighted average exercise price (1)
Outstanding at beginning of period	**7,055**	**$ 92.27**	6,973	$ 86.02
Granted	**1,184**	**129.99**	1,251	106.00
Exercised (2), (3)	**(684)**	**73.98**	(1,150)	65.56
Forfeited in the period	**(46)**	**104.28**	(19)	93.23
Outstanding at end of period	**7,509**	**$ 100.07**	7,055	$ 92.27
Exercisable at end of period	**3,502**	**$ 87.15**	3,273	$ 80.38

(1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rates as of October 31, 2022 and October 31, 2021. For foreign currency-denominated options exercised during the year, the weighted average exercise prices are translated using exchange rates as at the settlement date.

(2) Cash received for options exercised during the year was $61 million (October 31, 2021 – $75 million) and the weighted average share price at the date of exercise was $134.10 (October 31, 2021 – $115.11).

(3) New shares were issued for all stock options exercised in 2022 and 2021.

Options outstanding as at October 31, 2022 by range of exercise price

	Options outstanding			**Options exercisable**	
(Canadian dollars per share except share amounts and years)	**Number outstanding (thousands)**	**Weighted average exercise price (1)**	**Weighted average remaining contractual life (years)**	**Number exercisable (thousands)**	**Weighted average exercise price (1)**
$48.22 – $74.39	**890**	**$ 70.05**	**2.31**	**890**	**$ 70.05**
$78.28 – $90.23	**1,409**	**86.99**	**3.54**	**1,409**	**86.99**
$96.55 – $102.33	**1,743**	**98.90**	**5.19**	**1,203**	**99.96**
$104.70 – $106.00	**2,299**	**105.40**	**7.66**	**–**	**–**
$129.99	**1,168**	**129.99**	**9.12**	**–**	**–**
	7,509	**$ 100.07**	**5.91**	**3,502**	**$ 87.15**

(1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rate as of October 31, 2022.

The weighted average fair value of options granted during the year ended October 31, 2022 was estimated at $7.80 (October 31, 2021 – $4.65). This was determined by applying the Black-Scholes model on the date of grant, taking into account the specific terms and conditions under which the options are granted, such as the vesting period and expected share price volatility estimated by considering the historic average share price volatility over a historical period corresponding to the expected option life. The following assumptions were used to determine the fair value of options granted:

Weighted average assumptions

	For the year ended	
(Canadian dollars per share except percentages and years)	**October 31 2022**	October 31 2021
Share price at grant date	**$ 128.48**	$ 104.86
Risk-free interest rate	**1.25%**	0.48%
Expected dividend yield	**3.66%**	4.59%
Expected share price volatility	**13%**	14%
Expected life of option	**6 Years**	6 Years

Employee savings and share ownership plans

We offer many employees an opportunity to own our common shares through savings and share ownership plans.Under these plans, the employees can generally contribute between 1% and 10% of their annual salary or benefit base for commission-based employees. For each contribution between 1% and 6%, we will match 50% of the employee contributions in our common shares. For the RBC Dominion Securities Savings Plan, our maximum annual contribution is $4,500 per employee. For the RBC U.K. Share Incentive Plan, our maximum annual contribution is £1,500 per employee. For the year ended October 31, 2022, we contributed $128 million (October 31, 2021 – $123 million), under the terms of these plans, towards the purchase of our common shares. As at October 31, 2022, an aggregate of 36 million common shares were held under these plans (October 31, 2021 – 36 million common shares).

Deferred share and other plans

We offer deferred share unit plans to executives, certain key employees and non-employee directors of the Bank. Under these plans, participants may choose to receive all or a percentage of their annual variable short-term incentive bonus, commission, or directors' fee in the form of deferred share units (DSUs). The participants must elect to participate in the plan prior to the beginning of the year. DSUs earn dividend equivalents in the form of additional DSUs at the same rate as dividends on common shares. The participant is not allowed to convert the DSUs until retirement or termination of employment/directorship. The cash value of the DSUs is equivalent to the market value of common shares when conversion takes place.

We also offer unit awards for certain key employees within Capital Markets. The bonus is invested as RBC share units and a specified percentage vests on a specified number of anniversary dates each year. Each vested amount is paid in cash and is based on the original number of share units granted plus accumulated dividends, valued using the average closing price of RBC common shares during the five trading days immediately preceding the vesting date.

We offer performance deferred share award plans to certain key employees, all of which vest at the end of three years. Upon vesting, the award is paid in cash and is based on the original number of RBC share units granted plus accumulated dividends valued using the average closing price of RBC common shares during the five trading days immediately preceding the vesting date. A portion of the award under certain plans may be increased or decreased up to 25%, depending on our total shareholder return compared to a defined peer group of global financial institutions.

We maintain non-qualified deferred compensation plans for certain key employees in the U.S. These plans allow eligible employees to defer a portion of their annual income and a variety of productivity and recruitment bonuses and allocate the deferrals among specified fund choices, including a RBC Share Accounted fund that tracks the value of our common shares.

The following table presents the units granted under the deferred share and other plans for the year.

Units granted under deferred share and other plans

	For the year ended			
	October 31, 2022		October 31, 2021	
(Units and per unit amounts)	**Units granted (thousands)**	**Weighted average fair value per unit**	Units granted (thousands)	Weighted average fair value per unit
Deferred share unit plans	**469**	**$ 131.49**	462	$ 113.34
Capital Markets compensation plan unit awards	**3,794**	**125.22**	4,066	128.95
Performance deferred share award plans	**2,220**	**129.65**	2,486	106.10
Deferred compensation plans	**92**	**135.44**	87	104.21
Other share-based plans	**1,083**	**128.50**	767	109.24
	7,658	**$ 127.48**	7,868	$ 118.62

Our liabilities for the awards granted under the deferred share and other plans are measured at fair value, determined based on the quoted market price of our common shares and specified fund choices as applicable. Annually, our obligation is increased by additional units earned by plan participants, and is reduced by forfeitures, cancellations, and the settlement of vested units. In addition, our obligation is impacted by fluctuations in the market price of our common shares and specified fund units. For performance deferred share award plans, the estimated outcome of meeting the performance conditions also impacts our obligation.

Note 21 Share-based compensation (continued)

The following tables present the units that have been earned by the participants, our obligations for these earned units under the deferred share and other plans, and the related compensation expenses (recoveries) recognized for the year.

Obligations under deferred share and other plans

	As at			
	October 31, 2022		October 31, 2021	
(Millions of Canadian dollars except units)	**Units (thousands)**	**Carrying amount**	Units (thousands)	Carrying amount
Deferred share unit plans	**5,429**	**$ 684**	5,001	$ 644
Capital Markets compensation plan unit awards	**9,398**	**1,182**	9,925	1,280
Performance deferred share award plans	**6,006**	**757**	6,216	801
Deferred compensation plans (1)	**2,537**	**319**	2,574	331
Other share-based plans	**1,772**	**218**	1,724	216
	25,142	**$ 3,160**	25,440	$ 3,272

(1) Excludes obligations not determined based on the quoted market price of our common shares.

Compensation expenses recognized under deferred share and other plans

	For the year ended	
	October 31	October 31
(Millions of Canadian dollars)	**2022**	2021
Deferred share unit plans	**$ 20**	$ 205
Capital Markets compensation plan unit awards	**210**	518
Performance deferred share award plans	**273**	506
Deferred compensation plans	**(261)**	627
Other share-based plans	**91**	142
	$ 333	$ 1,998

Note 22 Income taxes

Components of tax expense

	For the year ended	
	October 31	October 31
(Millions of Canadian dollars)	**2022**	2021
Income taxes (recoveries) in Consolidated Statements of Income		
Current tax		
Tax expense for current year	**$ 4,151**	$ 4,893
Adjustments for prior years	**(230)**	(92)
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period	**–**	(16)
	3,921	4,785
Deferred tax		
Origination and reversal of temporary difference	**232**	(216)
Effects of changes in tax rates	**4**	(4)
Adjustments for prior years	**231**	74
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period, net	**(86)**	(58)
	381	(204)
	4,302	4,581
Income taxes (recoveries) in Consolidated Statements of Comprehensive Income and Changes in Equity		
Other comprehensive income		
Net unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income	**(633)**	(35)
Provision for credit losses recognized in income	**(2)**	–
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	**2**	(28)
Unrealized foreign currency translation gains (losses)	**2**	1
Net foreign currency translation gains (losses) from hedging activities	**(478)**	591
Reclassification of losses (gains) on net investment hedging activities to income	**6**	–
Net gains (losses) on derivatives designated as cash flow hedges	**628**	485
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	**70**	97
Remeasurements of employee benefit plans	**287**	796
Net fair value change due to credit risk on financial liabilities designated at fair value through profit or loss	**622**	20
Net gains (losses) on equity securities designated at fair value through other comprehensive income	**(3)**	17
Share-based compensation awards	**10**	(17)
Distributions on other equity instruments and issuance costs	**(45)**	(42)
	466	1,885
Total income taxes	**$ 4,768**	$ 6,466

The effective income tax rate of 21.4% decreased 80 bps, primarily due to higher tax-exempt income and an increase in income from lower tax rate jurisdictions in the current year.

The following is an analysis of the differences between the income tax expense reflected in the Consolidated Statements of Income and the amounts calculated at the Canadian statutory rate.

Reconciliation to statutory tax rate

	For the year ended			
(Millions of Canadian dollars, except for percentage amounts)	**October 31, 2022**		October 31, 2021	
Income taxes at Canadian statutory tax rate	**$ 5,269**	**26.2%**	$ 5,405	26.2%
Increase (decrease) in income taxes resulting from:				
Lower average tax rate applicable to subsidiaries	**(428)**	**(2.1)**	(361)	(1.8)
Tax-exempt income from securities	**(437)**	**(2.2)**	(379)	(1.8)
Tax rate change	**4**	**–**	(4)	–
Other	**(106)**	**(0.5)**	(80)	(0.4)
Income taxes in Consolidated Statements of Income / effective tax rate	**$ 4,302**	**21.4%**	$ 4,581	22.2%

Deferred tax assets and liabilities result from tax loss and tax credit carryforwards and temporary differences between the tax basis of assets and liabilities and their carrying amounts on our Consolidated Balance Sheets.

Significant components of deferred tax assets and liabilities

	As at and for the year ended October 31, 2022						
(Millions of Canadian dollars)	**Net asset beginning of period**	**Change through equity**	**Change through profit or loss**	**Exchange rate differences**	**Acquisitions/ disposals**	**Other**	**Net asset end of period**
Net deferred tax asset/(liability)							
Allowance for credit losses	**$ 974**	**$ –**	**$ 2**	**$ 11**	**$ –**	**$ –**	**$ 987**
Deferred compensation	**1,614**	**(10)**	**(211)**	**101**	**10**	**–**	**1,504**
Business realignment charges	**11**	**–**	**1**	**–**	**–**	**–**	**12**
Tax loss and tax credit carryforwards	**242**	**–**	**67**	**2**	**8**	**3**	**322**
Deferred (income) expense	**110**	**(1)**	**(126)**	**23**	**–**	**–**	**6**
Financial instruments measured at fair value through other comprehensive income	**(19)**	**(2)**	**–**	**5**	**–**	**–**	**(16)**
Premises and equipment and intangibles	**(836)**		**4**	**(57)**	**(345)**	**–**	**(1,234)**
Pension and post-employment related	**(163)**	**(287)**	**19**	**4**	**(8)**	**–**	**(435)**
Other	**4**	**22**	**(137)**	**(6)**	**4**	**–**	**(113)**
	$ 1,937	**$ (278)**	**$ (381)**	**$ 83**	**$ (331)**	**$ 3**	**$ 1,033**
Comprising							
Deferred tax assets	**$ 2,011**						**$ 1,472**
Deferred tax liabilities	**(74)**						**(439)**
	$ 1,937						**$ 1,033**

	As at and for the year ended October 31, 2021						
(Millions of Canadian dollars)	Net asset beginning of period	Change through equity	Change through profit or loss	Exchange rate differences	Acquisitions/ disposals	Other	Net asset end of period
Net deferred tax asset/(liability)							
Allowance for credit losses	$ 1,362	$ –	$ (372)	$ (16)	$ –	$ –	$ 974
Deferred compensation	1,269	17	396	(68)	–	–	1,614
Business realignment charges	9	–	2	–	–	–	11
Tax loss and tax credit carryforwards	204	–	40	(2)	–	–	242
Deferred (income) expense	(104)	6	205	3	–	–	110
Financial instruments measured at fair value through other comprehensive income	(68)	45	(1)	5	–	–	(19)
Premises and equipment and intangibles	(784)	–	(82)	30		–	(836)
Pension and post-employment related	592	(796)	45	(4)	–	–	(163)
Other	47	(12)	(29)	3	–	(5)	4
	$ 2,527	$ (740)	$ 204	$ (49)	$ –	$ (5)	$ 1,937
Comprising							
Deferred tax assets	$ 2,579						$ 2,011
Deferred tax liabilities	(52)						(74)
	$ 2,527						$ 1,937

Note 22 Income taxes (continued)

The tax loss and tax credit carryforwards amount of deferred tax assets primarily relates to losses and tax credits in our Canadian, U.S., and Caribbean operations. Deferred tax assets of $322 million were recognized at October 31, 2022 (October 31, 2021 – $242 million) in respect of tax losses and tax credits incurred in current or preceding years for which recognition is dependent on the projection of future taxable profits. Management's forecasts support the assumption that it is probable that the results of future operations will generate sufficient taxable income to utilize the deferred tax assets. The forecasts rely on continued liquidity and capital support to our business operations, including tax planning strategies implemented in relation to such support.

As at October 31, 2022, unused tax losses and tax credits of $429 million and $130 million (October 31, 2021 – $384 million and $207 million) available to be offset against potential tax adjustments or future taxable income were not recognized as deferred tax assets. There are no unused tax losses that will expire within one year (October 31, 2021 – $nil), or in two to four years (October 31, 2021 – $2 million) and there are $429 million of unused tax losses that will expire after four years (October 31, 2021 – $382 million). There are no tax credits that will expire in one year (October 31, 2021 – $nil), $93 million that will expire in two to four years (October 31, 2021 – $115 million) and $37 million that will expire after four years (October 31, 2021 – $92 million).

The amount of temporary differences associated with investments in subsidiaries, branches and associates and interests in joint ventures for which deferred tax liabilities have not been recognized in the parent bank is $26 billion as at October 31, 2022 (October 31, 2021 – $20 billion).

Tax examinations and assessments

During the year, we received a reassessment from the Canada Revenue Agency (CRA) in respect of the 2017 taxation year, which suggests that Royal Bank of Canada owes additional taxes of approximately $237 million as they denied the deductibility of certain dividends. The reassessment received during the year is consistent with the reassessments received for taxation years 2012 to 2016 of approximately $1,391 million of additional income taxes and the reassessments received for taxation years 2009 to 2011 of approximately $434 million of additional income taxes and interest in respect of the same matter. These amounts represent the maximum additional taxes owing for those years.

Legislative amendments introduced in the 2015 Canadian Federal Budget resulted in disallowed deduction of dividends from transactions with Taxable Canadian Corporations including those hedged with Tax Indifferent Investors, namely pension funds and non-resident entities with prospective application effective May 1, 2017. The dividends to which the reassessments relate include both dividends in transactions similar to those which are the target of the 2015 legislative amendments and dividends which are unrelated to the legislative amendments.

It is possible that the CRA will reassess us for significant additional income tax for subsequent years on the same basis. In all cases, we are confident that our tax filing position was appropriate and intend to defend ourselves vigorously.

Government of Canada Budget 2022

On April 7, 2022, the Government of Canada presented its 2022 budget, which included measures focused on ensuring banking and life insurers' groups help pay a portion of the costs of the Canadian federal government's COVID-19 pandemic response. On November 22, 2022, Bill C-32, Fall Economic Statement Implementation Act, 2022 (the Bill) received second reading in the House of Commons. The Bill includes a Canada Recovery Dividend (CRD) and a permanent increase in the corporate income tax rate. The CRD is a one-time 15% tax for 2022 determined based on the average taxable income above $1 billion for taxation years 2020 and 2021 and payable in equal installments over five years. The permanent increase in the corporate income tax rate is 1.5% on taxable income above $100 million and would apply to taxation years that end after April 7, 2022.

The Bill is not yet substantively enacted and timing of enactment remains uncertain. Based on the draft legislation, which remains subject to amendments prior to enactment, the CRD is expected to reduce net income by approximately $1 billion and other comprehensive income by approximately $0.1 billion when substantively enacted.

Note 23 Earnings per share

	For the year ended	
(Millions of Canadian dollars, except share and per share amounts)	**October 31 2022**	October 31 2021
Basic earnings per share		
Net income	**$ 15,807**	$ 16,050
Dividends on preferred shares and distributions on other equity instruments	**(247)**	(257)
Net income attributable to non-controlling interests	**(13)**	(12)
Net income available to common shareholders	**$ 15,547**	$ 15,781
Weighted average number of common shares (in thousands)	**1,403,654**	1,424,343
Basic earnings per share (in dollars)	**$ 11.08**	$ 11.08
Diluted earnings per share		
Net income available to common shareholders	**$ 15,547**	$ 15,781
Weighted average number of common shares (in thousands)	**1,403,654**	1,424,343
Stock options (1)	**1,918**	1,737
Issuable under other share-based compensation plans	**462**	655
Average number of diluted common shares (in thousands)	**1,406,034**	1,426,735
Diluted earnings per share (in dollars)	**$ 11.06**	$ 11.06

(1) The dilutive effect of stock options was calculated using the treasury stock method. When the exercise price of options outstanding is greater than the average market price of our common shares, the options are excluded from the calculation of diluted earnings per share. For the year ended October 31, 2

Note 24 Guarantees, commitments, pledged assets and contingencies

Guarantees and commitments

We use guarantees and other off-balance sheet credit instruments to meet the financing needs of our clients.

The table below summarizes our maximum exposure to credit losses related to our guarantees and commitments provided to third parties. The maximum exposure to credit risk relating to a guarantee is the maximum risk of loss if there was a total default by the guaranteed parties, without consideration of possible recoveries under recourse provisions, insurance policies or from collateral held or pledged. The maximum exposure to credit risk relating to a commitment to extend credit is the full amount of the commitment. In both cases, the maximum risk exposure is significantly greater than the amount recognized as a liability in our Consolidated Balance Sheets.

	Maximum exposure to credit losses As at	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Financial guarantees		
Financial standby letters of credit	**$ 20,291**	$ 16,867
Commitments to extend credit		
Backstop liquidity facilities	**45,336**	38,405
Credit enhancements	**2,960**	2,537
Documentary and commercial letters of credit	**318**	447
Other commitments to extend credit	**284,602**	248,522
Other credit-related commitments		
Securities lending indemnifications	**90,693**	99,797
Performance guarantees	**7,333**	7,195
Sponsored member guarantees	**1,241**	142
Other	**360**	326

Our credit review process, our policy for requiring collateral security, and the types of collateral security held are generally the same for guarantees and commitments as for loans. Our clients generally have the right to request settlement of, or draw on, our guarantees and commitments within one year. However, certain guarantees can only be drawn if specified conditions are met. These conditions, along with collateral requirements, are described below. We believe that it is highly unlikely that all or substantially all of the guarantees and commitments will be drawn or settled within one year, and contracts may expire without being drawn or settled.

Financial guarantees

Financial standby letters of credit

Financial standby letters of credit represent irrevocable assurances that we will make payments in the event that a client cannot meet its payment obligations to the third party. For certain guarantees, the guaranteed party can request payment from us even though the client has not defaulted on its obligations. These guarantees generally have a term of five to seven years.

Our policy for requiring collateral security with respect to these instruments and the types of collateral security held is generally the same as for loans. When collateral security is taken, it is determined on an account-by-account basis according to the risk of the borrower and the specifics of the transaction. Collateral security may include cash, securities and other assets pledged.

Commitments to extend credit

Backstop liquidity facilities

Backstop liquidity facilities are provided to ABCP conduit programs administered by us and third parties as an alternative source of financing in the event that such programs are unable to access commercial paper markets, or in limited circumstances, when predetermined performance measures of the financial assets acquired or financed by these programs are not met. The average remaining term of these liquidity facilities is approximately four years.

The terms of the backstop liquidity facilities do not require us to advance money to these programs in the event of bankruptcy or insolvency and generally do not require us to purchase non-performing or defaulted assets.

Credit enhancements

We provide partial credit enhancement to multi-seller ABCP programs administered by us to protect commercial paper investors in the event that the collections on the underlying assets together with the transaction-specific credit enhancements or the liquidity facilities prove to be insufficient to pay for maturing commercial paper. Each of the asset pools is structured to achieve a high investment grade credit profile through credit enhancements required to be provided by the third-party sellers related to each transaction. The average remaining term of these credit facilities is approximately three years.

Documentary and commercial letters of credit

Documentary and commercial letters of credit, which are written undertakings by us on behalf of a client authorizing a third party to draw drafts on us up to a stipulated amount under specific terms and conditions, where some are collateralized based on the underlying agreement with the client and others are collateralized by cash deposits or other assets of the client.

Note 24 Guarantees, commitments, pledged assets and contingencies (continued)

Other commitments to extend credit
Commitments to extend credit represent unused portions of authorizations to extend credit in the form of loans, reverse repurchase agreements, bankers' acceptances or letters of credit where we do not have the ability to unilaterally withdraw the credit extended to the borrower.

Other credit-related commitments
Securities lending indemnifications
In securities lending transactions, we act as an agent for the owner of a security, who agrees to lend the security to a borrower for a fee, under the terms of a pre-arranged contract. The borrower must fully collateralize the security loaned at all times. As part of this custodial business, an indemnification may be provided to securities lending customers to ensure that the fair value of securities loaned will be returned in the event that the borrower fails to return the borrowed securities and the collateral held is insufficient to cover the fair value of those securities. These indemnifications normally terminate without being drawn upon. The term of these indemnifications varies, as the securities loaned are recallable on demand. Collateral held for our securities lending transactions typically includes cash, securities that are issued or guaranteed by the Canadian government, U.S. government or other OECD countries or high quality debt or equity instruments.

Performance guarantees
Performance guarantees represent irrevocable assurances that we will make payments to third-party beneficiaries in the event that a client fails to perform under a specified non-financial contractual obligation. Such obligations typically include works and service contracts, performance bonds, and warranties related to international trade. The term of these guarantees can range up to three to seven years.

Our policy for requiring collateral security with respect to these instruments and the types of collateral security held is generally the same as for loans. When collateral security is taken, it is determined on an account-by-account basis according to the risk of the borrower and the specifics of the transaction. Collateral security may include cash, securities and other assets pledged.

Sponsored member guarantees
For certain overnight repurchase and reverse repurchase transactions, we act as a sponsoring member to eligible clients to clear transactions through the Fixed Income Clearing Corporation (FICC). We also provide a guarantee to FICC for the prompt and full payment and performance of our sponsored member clients' respective obligations under the FICC rules. The guarantees are fully collateralized by cash and securities issued or guaranteed by the U.S. government.

Indemnifications
In the normal course of our operations, we provide indemnifications which are often standard contractual terms to counterparties in transactions such as purchase and sale contracts, fiduciary, agency, licensing, custodial and service agreements, clearing system arrangements, participation as a member of exchanges, director/officer contracts and leasing transactions. These indemnification agreements may require us to compensate the counterparties for costs incurred as a result of changes in laws and regulations (including tax legislation) or as a result of litigation claims or statutory sanctions that may be suffered by the counterparty as a consequence of the transaction. The terms of these indemnification agreements vary based on the contract. The nature of the indemnification agreements prevents us from making a reasonable estimate of the maximum potential amount we could be required to pay to counterparties. Historically, we have not made any significant payments under such indemnifications.

Uncommitted amounts
Uncommitted amounts represent undrawn credit facilities for which we have the ability to unilaterally withdraw the credit extended to the borrower at any time. These include both retail and commercial commitments. As at October 31, 2022, the total balance of uncommitted amounts was $363 billion (October 31, 2021 – $333 billion).

Other commitments
We invest in private companies, directly or through third-party investment funds, including Small Business Investment Companies, real estate funds and Low Income Housing Tax Credit funds. These funds are generally structured as closed-end limited partnerships wherein we hold a limited partner interest. For the year ended October 31, 2022, we have unfunded commitments of $1,421 million (October 31, 2021 – $1,396 million) representing the aggregate amount of cash we are obligated to contribute as capital to these partnerships under the terms of the relevant contracts.

Pledged assets and collateral
In the ordinary course of business, we pledge assets and enter into collateral agreements with terms and conditions that are usual and customary to our regular lending, borrowing and trading activities recorded on our Consolidated Balance Sheets. The following are examples of our general terms and conditions on pledged assets and collateral:

- The risks and rewards of the pledged assets reside with the pledgor.
- The pledged asset is returned to the pledgor when the necessary conditions have been satisfied.
- The right of the pledgee to sell or re-pledge the asset is dependent on the specific agreement under which the collateral is pledged.
- If there is no default, the pledgee must return the comparable asset to the pledgor upon satisfaction of the obligation.

We are also required to provide intraday pledges to the Bank of Canada when we use a real-time electronic wire transfer system that continuously processes all Canadian dollar large-value or time-critical payments throughout the day. The pledged assets earmarked for our Canadian dollar large-value or time-critical payments are normally released back to us at the end of the settlement cycle each day. Therefore, the pledged assets amount is not included in the following table. For the year ended October 31, 2022, we had on average $2 billion of assets pledged intraday to the Bank of Canada on a daily basis (October 31, 2021 – $2 billion). There are infrequent occasions where we are required to take an overnight advance from the Bank of Canada to cover a settlement requirement, in which case an equivalent value of the pledged assets would be used to secure the advance. There were no overnight advances taken on October 31, 2022 and October 31, 2021.

Assets pledged against liabilities and collateral assets held or re-pledged

	As at	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Sources of pledged assets and collateral		
Bank assets		
Loans	**$ 97,178**	$ 79,282
Securities	**70,334**	66,277
Other assets	**40,318**	25,981
	207,830	171,540
Client assets (1)		
Collateral received and available for sale or re-pledging	**465,484**	454,844
Less: not sold or re-pledged	**(9,192)**	(17,436)
	456,292	437,408
	$ 664,122	$ 608,948
Uses of pledged assets and collateral		
Securities borrowing and lending	**$ 158,748**	$ 154,699
Obligations related to securities sold short	**45,288**	46,151
Obligations related to securities lent or sold under repurchase agreements	**274,392**	263,005
Securitization	**40,438**	39,687
Covered bonds	**62,905**	46,699
Derivative transactions	**49,556**	31,941
Foreign governments and central banks	**9,503**	7,314
Clearing systems, payment systems and depositories	**8,263**	3,809
Other	**15,029**	15,643
	$ 664,122	$ 608,948

(1) Primarily relates to Obligations related to securities lent or sold under repurchase agreements, Securities lent and Derivative transactions.

Note 25 Legal and regulatory matters

We are a large global institution that is subject to many different complex legal and regulatory requirements that continue to evolve. We are and have been subject to a variety of legal proceedings, including civil claims and lawsuits, regulatory examinations, investigations, audits and requests for information by various governmental regulatory agencies and law enforcement authorities in various jurisdictions. Some of these matters may involve novel legal theories and interpretations and may be advanced under criminal as well as civil statutes, and some proceedings could result in the imposition of civil, regulatory enforcement or criminal penalties. We review the status of all proceedings on an ongoing basis and will exercise judgment in resolving them in such manner as we believe to be in our best interest. In many proceedings, it is inherently difficult to determine whether any loss is probable or to reliably estimate the amount of any loss. This is an area of significant judgment and uncertainty and the extent of our financial and other exposure to these proceedings after taking into account current provisions could be material to our results of operations in any particular period. The following is a description of our significant legal proceedings.

London interbank offered rate (LIBOR) litigation

Royal Bank of Canada and other U.S. dollar panel banks have been named as defendants in private lawsuits filed in the U.S. with respect to the setting of U.S. dollar LIBOR including a number of class action lawsuits which have been consolidated before the U.S. District Court for the Southern District of New York. The complaints in those private lawsuits assert claims against us and other panel banks under various U.S. laws, including U.S. antitrust laws, the U.S. Commodity Exchange Act, and state law. On December 30, 2021, the U.S. Court of Appeals for the Second Circuit issued an opinion affirming in part and reversing in part certain district court rulings that had dismissed a substantial portion of the consolidated class action on jurisdictional grounds and lack of standing. The Second Circuit remanded the matter to the district court for further proceedings consistent with its decision.

Based on the facts currently known, it is not possible at this time for us to predict the ultimate outcome of these proceedings or the timing of their resolution.

Note 25 Legal and regulatory matters (continued)

Royal Bank of Canada Trust Company (Bahamas) Limited proceedings

On April 13, 2015, a French investigating judge notified Royal Bank of Canada Trust Company (Bahamas) Limited (RBC Bahamas) of the issuance of an*ordonnance de renvoi* referring RBC Bahamas and other unrelated persons to the French *tribunal correctionnel* to face the charge of complicity in estate tax fraud relating to actions taken relating to a trust for which RBC Bahamas serves as trustee. RBC Bahamas believes that its actions did not violate French law and contested the charge in the French court. On January 12, 2017, the French court acquitted all parties including RBC Bahamas and on June 29, 2018, the French appellate court affirmed the acquittals. The acquittals were appealed and on January 6, 2021, the French Supreme Court issued a judgment reversing the decision of the French Court of Appeal and sent the case back to the French Court of Appeal for rehearing. The Court of Appeal has scheduled a new trial to begin on September 18, 2023.

On October 28, 2016, Royal Bank of Canada was granted an exemption by the U.S. Department of Labor that allows Royal Bank of Canada and its current and future affiliates to continue to qualify for the Qualified Professional Asset Manager (QPAM) exemption under the Employee Retirement Income Security Act despite any potential conviction of RBC Bahamas in the French proceeding for a temporary one year period from the date of conviction. In addition, the Department of Labor has proposed amendments to the QPAM exemption. If the amendments are finalized as proposed, it is unclear how they would affect Royal Bank of Canada's ability to obtain relief beyond the one-year temporary exemption period.

RBC Bahamas continues to review the trustee's and the trust's legal obligations, including liabilities and potential liabilities under applicable tax and other laws. Based on the facts currently known, it is not possible at this time to predict the ultimate outcome of these matters; however, we believe that the ultimate resolution will not have a material effect on our consolidated financial position, although it may be material to our results of operations in the period it occurs.

Foreign exchange matters

Beginning in 2015, putative class actions were brought against Royal Bank of Canada and/or RBC Capital Markets, LLC in the U.S., Canada, the United Kingdom and Brazil. These actions were each brought against multiple foreign exchange dealers and allege, among other things, collusive behaviour in global foreign exchange trading. In August 2018, the U.S. District Court entered a final order approving RBC Capital Markets, LLC's pending settlement with class plaintiffs. In November 2018, certain institutional plaintiffs who had previously opted-out of participating in the settlement filed their own lawsuit in the U.S. District Court (the "Opt Out Action"). In May 2020, the U.S. District Court dismissed Royal Bank of Canada from the Opt Out Action. The plaintiffs refiled their claim and in July 2021, the U.S. District Court granted a motion in favour of RBC Capital Markets, LLC to dismiss the action, however, denied the motion as to Royal Bank of Canada.

Royal Bank of Canada has reached a settlement for an immaterial amount with respect to a U.S. action brought by a different class of plaintiffs. The Canadian class actions have been settled.

In its discretion Royal Bank of Canada may choose to resolve claims, litigations, or similar matters at any time. Based on the facts currently known, it is not possible at this time to predict the ultimate outcome of the Foreign Exchange Matters or the timing of their ultimate resolution.

U.S. communications recordkeeping inquiry

In October 2022, our subsidiary RBC Capital Markets, LLC received a request for information and documents from the Securities and Exchange Commission (SEC) concerning compliance with records preservation requirements relating to business communications exchanged on electronic channels that have not been approved by RBC Capital Markets, LLC. RBC Capital Markets, LLC is cooperating with the SEC's inquiry. As has been publicly reported, the SEC is conducting similar inquiries into recordkeeping practices at multiple other financial institutions.

Based on the facts currently known, it is not possible at this time to predict the ultimate outcome of this inquiry or the timing of its resolution.

U.K. Competition and Markets Authority investigation

RBC Europe Limited is engaging with the U.K. Competition and Markets Authority in respect of an investigation of alleged anti-competitive arrangements in the financial services sector between 2009 and 2013. The outcome and resulting financial impact of this investigation is unknown and not reliably estimable.

Other matters

We are a defendant in a number of other actions alleging that certain of our practices and actions were improper. The lawsuits involve a variety of complex issues and the timing of their resolution is varied and uncertain. Management believes that we will ultimately be successful in resolving these lawsuits, to the extent that we are able to assess them, without material financial impact to the Bank. This is, however, an area of significant judgment and the potential liability resulting from these lawsuits could be material to our results of operations in any particular period.

Various other legal proceedings are pending that challenge certain of our other practices or actions. While this is an area of significant judgment and some matters are currently inestimable, we consider that the aggregate liability, to the extent that we are able to assess it, resulting from these other proceedings will not be material to our consolidated financial position or results of operations.

Note 26 Related party transactions

Related parties

Related parties include associated companies over which we have direct or indirect control or have significant influence and post-employment benefit plans for the benefit of our employees. Related parties also include key management personnel (KMP), the Board of Directors (Directors), close family members of KMP and Directors, and entities which are, directly or indirectly, controlled by or jointly controlled by KMP, Directors or their close family members.

Key management personnel and Directors

KMP are defined as those persons having authority and responsibility for planning, directing and controlling our activities, directly or indirectly. They include the senior members of our organization called the Group Executive (GE). The GE is comprised of the President and Chief Executive Officer, and the Chief Officers and Group Heads, who report directly to him. The Directors do not plan, direct, or control the activities of the entity; they oversee the management of the business and provide stewardship.

Compensation of Key management personnel and Directors

	For the year ended	
(Millions of Canadian dollars)	**October 31 2022** (1)	October 31 2021
Salaries and other short-term employee benefits (2)	**$ 27**	$ 19
Post-employment benefits (3)	**2**	3
Share-based payments	**40**	35
	$ 69	$ 57

(1) During the year ended October 31, 2022 certain executives, who were members of the Bank's GE as at October 31, 2021, left the Bank and therefore were no longer part of KMP. Compensation for the year ended October 31, 2022 attributable to the former executives, including benefits and share-based payments relating to awards granted in prior years was $14 million.
(2) Includes the portion of the annual variable short-term incentive bonus that certain executives elected to receive in the form of DSUs. Refer to Note 21 for further details. Directors receive retainers but do not receive salaries and other short-term employee benefits.
(3) Directors do not receive post-employment benefits.

Stock options, stock awards and shares held by Key management personnel, Directors and their close family members

	As at			
	October 31, 2022 (1)		October 31, 2021 (2)	
(Millions of Canadian dollars, except number of units)	**No. of units held**	**Value**	No. of units held	Value
Stock options (3)	**2,409,294**	**$ 59**	2,369,659	$ 81
Other non-option stock based awards (3)	**914,496**	**115**	983,004	127
RBC common and preferred shares	**170,312**	**22**	183,783	24
	3,494,102	**$ 196**	3,536,446	$ 232

(1) During the year ended October 31, 2022 certain executives, who were members of the Bank'sGE as at October 31, 2021, left the Bank and therefore were no longer part of KMP. Total shareholdings and options held upon their departure was 569,470 units with a value of $34 million.
(2) During the year ended October 31, 2021 certain directors, who were members of the Board of Directors as at October 31, 2020, retired. Total shareholdings held upon their retirement was 21,723 units with a value of $1 million.
(3) Directors do not receive stock options or any other non-option stock based awards.

Transactions, arrangements and agreements involving Key management personnel, Directors and their close family members

In the normal course of business, we provide certain banking services to KMP, Directors, and their close family members. These transactions were made on substantially the same terms, including interest rates and security, as for comparable transactions with persons of a similar standing and did not involve more than the normal risk of repayment or present other unfavourable features.

As at October 31, 2022, total loans to KMP, Directors and their close family members were $14 million (October 31, 2021 – $14 million). We have no stage 3 allowance or provision for credit losses relating to these loans as at and for the years ended October 31, 2022 and October 31, 2021. No guarantees, pledges or commitments have been given to KMP, Directors or their close family members.

Joint ventures and associates

In the normal course of business, we provide certain banking and financial services to our joint ventures and associates, including loans, interest and non-interest bearing deposits. These transactions meet the definition of related party transactions and were made on substantially the same terms as for comparable transactions with third parties.

As at October 31, 2022, loans to joint ventures and associates were $251 million (October 31, 2021 – $340 million) and deposits from joint ventures and associates were $20 million (October 31, 2021 – $13 million). We have no Stage 3 allowance or provision for credit losses relating to loans to joint ventures and associates as at and for the years ended October 31, 2022 and October 31, 2021. $1 million of guarantees have been given to joint ventures and associates for the year ended October 31, 2022 (October 31, 2021 – $1 million).

Other transactions, arrangements or agreements involving joint ventures and associates

	As at or for the year ended	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Commitments and other contingencies	**$ 829**	$ 1,017
Other fees received for services rendered	**50**	48
Other fees paid for services received	**107**	108

Note 27 Results by business segment

Composition of business segments
For management purposes, based on the products and services offered, we are organized intofive business segments: Personal & Commercial Banking, Wealth Management, Insurance, Investor & Treasury Services and Capital Markets.

Personal & Commercial Banking provides a broad suite of financial products and services to individuals and businesses for their day-to-day banking, investing and financing needs through two businesses: Canadian Banking and Caribbean & U.S. Banking. In Canada, we provide a broad suite of financial products and services through our large branch network, automated teller machines, and mobile sales network. In the Caribbean and the U.S., we offer a broad range of financial products and services in targeted markets. Non-interest income in Personal & Commercial Banking mainly comprises Service charges, Mutual fund revenue and Card service revenue.

Wealth Management serves high net worth and ultra-high net worth individual and institutional clients with a comprehensive suite of advice-based solutions and strategies to help them achieve their financial goals through our lines of businesses in Canada, the U.S., the U.K., Europe and Asia, including Canadian Wealth Management, U.S. Wealth Management (including City National), Global Asset Management, and International Wealth Management. Non-interest income in Wealth Management mainly comprises Investment management and custodial fees, Mutual fund revenue and Securities brokerage commissions.

Insurance has operations in Canada and globally, operating under two business lines: Canadian Insurance and International Insurance, providing a wide range of advice and solutions for individual and business clients including life, health, wealth, home, auto, travel, annuities and reinsurance. In Canada, we offer our products and services through a wide variety of channels, comprised of mobile advisors, advice centres, RBC Insurance® stores, and digital platforms as well as through independent brokers and partners. Outside Canada, we operate in reinsurance and retrocession markets globally offering life, disability and longevity reinsurance products. Non-interest income in Insurance comprises Insurance premiums, investment and fee income.

Investor & Treasury Services offers custody, fund administration, shareholder services, private capital services, middle office transaction banking (including trade finance, insourced solutions and services to broker dealers), and treasury and market services (including cash/liquidity management, foreign exchange and securities finance). Non-interest income in Investor & Treasury Services mainly comprises Investment management and custodial fees, and Foreign exchange revenue, other than trading.

Capital Markets provides expertise in advisory & origination, sales & trading, and lending & financing to corporations, institutional clients, asset managers, private equity firms and governments globally in our two main business lines: Corporate & Investment Banking and Global Markets. In North America, we offer a full suite of products and services which include equity and debt origination and distribution, advisory services, and sales & trading. Outside North America, we have a targeted strategic presence in the U.K. & Europe, Australia, Asia & other markets aligned to our global expertise. In the U.K. & Europe, we offer a diversified set of capabilities in key industry sectors of focus. In Australia and Asia, we compete with global and regional investment banks in targeted areas aligned to our global expertise, including fixed income distribution and currencies trading, secured financing, as well as corporate and investment banking. Non-interest income in Capital Markets mainly includes Trading revenue, Underwriting and other advisory fees and Credit fees.

All other enterprise level activities that are not allocated to these five business segments, such as certain treasury and liquidity management activities, including amounts associated with unattributed capital, and consolidation adjustments, including the elimination of the Taxable equivalent basis (Teb) gross-up amounts, are included in Corporate Support. Teb adjustments gross up income from certain tax-advantaged sources from Canadian taxable corporate dividends and U.S. tax credit investments recorded in Capital Markets to their effective tax equivalent value with the corresponding offset recorded in the provision for income taxes. Management believes that these Teb adjustments are necessary for Capital Markets to reflect how it is managed and enhances the comparability of revenue across our taxable and tax-advantaged sources. Our use of Teb adjustments may not be comparable to similarly adjusted amounts at other financial institutions. The Teb adjustment for the year ended October 31, 2022 was $572 million (October 31, 2021 – $518 million). Gains (losses) on economic hedges of our U.S. Wealth Management (including City National) share-based compensation plans, which are reflected in revenue, and related variability in share-based compensation expense driven by changes in the fair value of liabilities relating to these plans are also included in Corporate Support as this presentation more closely aligns with how we view business performance and manage the underlying risks.

Geographic segments
For geographic reporting, our segments are grouped into Canada, the U.S. and Other International. Transactions are primarily recorded in the location that best reflects the risk due to negative changes in economic conditions and prospects for growth due to positive economic changes. This location frequently corresponds with the location of the legal entity through which the business is conducted and the location of our clients. Transactions are recorded in the local currency and are subject to foreign exchange rate fluctuations with respect to the movement in the Canadian dollar.

Management reporting framework
Our management reporting framework is intended to measure the performance of each business segment as if it were a stand-alone business and reflects the way that the business segment is managed. This approach is intended to ensure that our business segments' results include all applicable revenue and expenses associated with the conduct of their business and depicts how management views those results. We regularly monitor these segment results for the purpose of making decisions about resource allocation and performance assessment. These items do not impact our consolidated results.

The expenses in each business segment may include costs or services directly incurred or provided on their behalf at the enterprise level. For other costs not directly attributable to one of our business segments, we use a management reporting framework that uses assumptions and methodologies for allocating overhead costs and indirect expenses to our business

segments and that assists in the attribution of capital and the transfer pricing of funds to our business segments in a manner that consistently measures and aligns the economic costs with the underlying benefits and risks of that specific business segment. Activities and business conducted between our business segments are generally at market rates. All other enterprise level activities that are not allocated to our five business segments are reported under Corporate Support.

Our assumptions and methodologies used in our management reporting framework are periodically reviewed by us to ensure that they remain valid. The capital attribution methodologies involve a number of assumptions that are revised periodically.

	For the year ended October 31, 2022									
(Millions of Canadian dollars)	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Canada	United States	Other International
Net interest income (2)	$ 14,019	$ 3,634	$ –	$ 498	$ 4,698	$ (132)	$ 22,717	$ 15,761	$ 5,423	$ 1,533
Non-interest income	6,124	11,215	3,510	1,725	4,422	(728)	26,268	13,508	6,364	6,396
Total revenue	20,143	14,849	3,510	2,223	9,120	(860)	48,985	29,269	11,787	7,929
Provision for credit losses	463	34	–	(3)	(11)	1	484	600	60	(176)
Insurance policyholder benefits, claims and acquisition expense	–	–	1,783	–	–	–	1,783	(466)	–	2,249
Non-interest expense	8,437	10,701	588	1,569	5,561	(247)	26,609	13,648	9,006	3,955
Net income (loss) before income taxes	11,243	4,114	1,139	657	3,570	(614)	20,109	15,487	2,721	1,901
Income taxes (recoveries)	2,873	970	282	144	649	(616)	4,302	3,615	452	235
Net income	$ 8,370	$ 3,144	$ 857	$ 513	$ 2,921	$ 2	$ 15,807	$ 11,872	$ 2,269	$ 1,666
Non-interest expense includes:										
Depreciation and amortization	$ 942	$ 931	$ 57	$ 190	$ 502	$ 12	$ 2,634	$ 1,617	$ 776	$ 241
Impairment of other intangibles	11	2	2	1	2	–	18	11	5	2
Total assets	$ 602,824	$ 174,964	$ 21,918	$ 263,362	$ 794,032	$ 60,119	$ 1,917,219	$ 992,485	$ 570,255	$ 354,479
Total assets include:										
Additions to premises and equipment and intangibles	$ 394	$ 2,265	$ 49	$ 84	$ 256	$ 630	$ 3,678	$ 1,263	$ 666	$ 1,749
Total liabilities	$ 602,741	$ 174,986	$ 22,588	$ 263,206	$ 793,826	$ (48,303)	$ 1,809,044	$ 884,394	$ 570,266	$ 354,384

	For the year ended October 31, 2021									
(Millions of Canadian dollars)	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Canada	United States	Other International
Net interest income (2)	$ 12,621	$ 2,689	$ –	$ 460	$ 4,553	$ (321)	$ 20,002	$ 13,947	$ 4,447	$ 1,608
Non-interest income	5,725	10,607	5,600	1,704	5,634	421	29,691	15,454	8,083	6,154
Total revenue	18,346	13,296	5,600	2,164	10,187	100	49,693	29,401	12,530	7,762
Provision for credit losses	(187)	(47)	(1)	(8)	(509)	(1)	(753)	(203)	(277)	(273)
Insurance policyholder benefits, claims and acquisition expense	–	–	3,891	–	–	–	3,891	2,036	–	1,855
Non-interest expense	7,978	9,929	596	1,589	5,427	405	25,924	12,897	9,107	3,920
Net income (loss) before income taxes	10,555	3,414	1,114	583	5,269	(304)	20,631	14,671	3,700	2,260
Income taxes (recoveries)	2,708	788	225	143	1,082	(365)	4,581	3,599	649	333
Net income	$ 7,847	$ 2,626	$ 889	$ 440	$ 4,187	$ 61	$ 16,050	$ 11,072	$ 3,051	$ 1,927
Non-interest expense includes:										
Depreciation and amortization	$ 923	$ 883	$ 59	$ 197	$ 497	$ 4	$ 2,563	$ 1,594	$ 728	$ 241
Impairment of other intangibles	5	3	1	2	18	–	29	16	11	2
Total assets	$ 549,702	$ 148,990	$ 22,724	$ 240,055	$ 692,278	$ 52,574	$ 1,706,323	$ 964,747	$ 454,949	$ 286,627
Total assets include:										
Additions to premises and equipment and intangibles	$ 503	$ 752	$ 48	$ 80	$ 355	$ 459	$ 2,197	$ 1,238	$ 739	$ 220
Total liabilities	$ 549,619	$ 149,096	$ 22,966	$ 239,960	$ 691,767	$ (45,847)	$ 1,607,561	$ 866,287	$ 454,903	$ 286,371

(1) Taxable equivalent basis.

(2) Interest revenue is reported net of interest expense as we rely primarily on net interest income as a performance measure.

Note 28 Nature and extent of risks arising from financial instruments

We are exposed to credit, market and liquidity and funding risks as a result of holding financial instruments. Our risk measurement and objectives, policies and methodologies for managing these risks are disclosed in the shaded text along with those tables specifically marked with an asterisk (*) in the Credit risk section of Management's Discussion and Analysis. These shaded text and tables are an integral part of these Consolidated Financial Statements.

Concentrations of credit risk exist if a number of our counterparties are engaged in similar activities, are located in the same geographic region or have comparable economic characteristics such that their ability to meet contractual obligations would be similarly affected by changes in economic, political or other conditions.

Note 28 Nature and extent of risks arising from financial instruments (continued)

Concentrations of credit risk indicate the relative sensitivity of our performance to developments affecting a particular industry or geographic location. The amounts of credit exposure associated with certain of our on- and off-balance sheet financial instruments are summarized in the following tables.

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2022									
	Canada	**%**	**United States**	**%**	**Europe**	**%**	**Other International**	**%**	**Total**
On-balance sheet assets other than derivatives (1)	**$ 759,037**	**65%**	**$ 263,736**	**23%**	**$ 87,671**	**8%**	**$ 48,991**	**4%**	**$ 1,159,435**
Derivatives before master netting agreements (2), (3)	**32,434**	**20%**	**35,921**	**23%**	**72,885**	**46%**	**17,439**	**11%**	**158,679**
	$ 791,471	**60%**	**$ 299,657**	**23%**	**$ 160,556**	**12%**	**$ 66,430**	**5%**	**$ 1,318,114**
Off-balance sheet credit instruments (4)									
Committed and uncommitted (5)	**$ 398,719**	**57%**	**$ 223,624**	**32%**	**$ 52,669**	**8%**	**$ 20,857**	**3%**	**$ 695,869**
Other	**79,110**	**66%**	**13,847**	**12%**	**24,476**	**20%**	**2,485**	**2%**	**119,918**
	$ 477,829	**59%**	**$ 237,471**	**29%**	**$ 77,145**	**9%**	**$ 23,342**	**3%**	**$ 815,787**

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2021								
	Canada	%	United States	%	Europe	%	Other International	%	Total
On-balance sheet assets other than derivatives (1)	$ 701,779	67%	$ 213,389	20%	$ 85,271	8%	$ 49,001	5%	$ 1,049,440
Derivatives before master netting agreements (2), (3)	19,927	21%	23,910	25%	45,717	47%	7,111	7%	96,665
	$ 721,706	63%	$ 237,299	21%	$ 130,988	11%	$ 56,112	5%	$ 1,146,105
Off-balance sheet credit instruments (4)									
Committed and uncommitted (5)	$ 370,479	59%	$ 196,692	32%	$ 46,187	8%	$ 9,335	1%	$ 622,693
Other	82,010	66%	14,014	11%	26,920	22%	1,383	1%	124,327
	$ 452,489	61%	$ 210,706	28%	$ 73,107	10%	$ 10,718	1%	$ 747,020

(1) Includes Assets purchased under reverse repurchase agreements and securities borrowed, Loans and Customers' liability under acceptances. The largest concentrations in Canada are Ontario at 56% (October 31, 2021 – 56%), the Prairies at 15% (October 31, 2021 – 16%), British Columbia and the territories at 15% (October 31, 2021 – 14%) and Quebec at 10% (October 31, 2021 – 10%). No industry accounts for more than 20% (October 31, 2021 – 20%) of total on-balance sheet credit instruments with the exception of Banking, which accounted for 26% (October 31, 2021 – 24%), and Government, which accounted for 32% (October 31, 2021 – 37%). The classification of our sectors aligns with our view of credit risk by industry.

(2) A further breakdown of our derivative exposures by risk rating and counterparty type is provided in Note 9.

(3) Excludes valuation adjustments determined on a pooled basis.

(4) Balances presented are contractual amounts representing our maximum exposure to credit risk.

(5) Represents our maximum exposure to credit risk. Retail and wholesale commitments respectively comprise 45% and 55% of our total commitments (October 31, 2021 – 45% and 55%). The largest concentrations in the wholesale portfolio relate to Financial services at 15% (October 31, 2021 – 13%), Real estate and related at 12% (October 31, 2021 – 10%), Utilities at 11% (October 31, 2021 – 10%), Other services at 7% (October 31, 2021 – 8%), and Oil and gas at 6% (October 31, 2021 – 6%). The classification of our sectors aligns with our view of credit risk by industry.

Note 29 Capital management

Regulatory capital and capital ratios

OSFI formally establishes risk-based capital and leverage minimums and Total Loss Absorbing Capacity (TLAC) ratios for deposit-taking institutions in Canada. We are required to calculate our capital ratios using the Basel III framework. Under Basel III, regulatory capital includes Common Equity Tier 1 (CET1), Tier 1 and Tier 2 capital. CET1 capital mainly consists of common shares, retained earnings and other components of equity. Regulatory adjustments under Basel III include deductions of goodwill and other intangibles, certain deferred tax assets, defined benefit pension fund assets, investments in banking, financial and insurance entities, and the shortfall of provisions to expected losses. Tier 1 capital comprises predominantly CET1 and Additional Tier 1 items including non-cumulative preferred shares and LRCNs that meet certain criteria. Tier 2 capital includes subordinated debentures that meet certain criteria, certain loan loss allowances and non-controlling interests in subsidiaries' Tier 2 instruments. Total capital is the sum of Tier 1 and Tier 2 capital. External TLAC instruments comprise predominantly senior bail-in debt, which includes eligible senior unsecured debt with an original term to maturity of greater than 400 days and remaining term to maturity of greater than 365 days. TLAC available is defined as the sum of Total capital and other TLAC instruments.

Regulatory capital ratios are calculated by dividing CET1, Tier 1 and Total capital by risk-weighted assets. The leverage ratio is calculated by dividing Tier 1 capital by an exposure measure. The exposure measure consists of total assets (excluding items deducted from Tier 1 capital) and certain off-balance sheet items converted into credit exposure equivalents. Adjustments are also made to derivatives and secured financing transactions to reflect credit and other risks.

During 2022 and 2021, we complied with all applicable capital, leverage and TLAC requirements, including the domestic stability buffer, imposed by OSFI.

	As at	
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	**October 31 2022**	October 31 2021
Capital (1)		
CET1 capital	**$ 76,945**	$ 75,583
Tier 1 capital	**84,242**	82,246
Total capital	**93,850**	92,026
Risk-weighted assets (RWA) used in calculation of capital ratios (1)		
Credit risk	**$ 496,898**	$ 444,142
Market risk	**35,342**	34,806
Operational risk	**77,639**	73,593
Total RWA	**$ 609,879**	$ 552,541
Capital ratios and Leverage ratio (1)		
CET1 ratio	**12.6%**	13.7%
Tier 1 capital ratio	**13.8%**	14.9%
Total capital ratio	**15.4%**	16.7%
Leverage ratio	**4.4%**	4.9%
Leverage ratio exposure (billions)	**$ 1,898**	$ 1,662
TLAC available and ratios (2), (3)		
TLAC available	**$ 160,961**	n.a.
TLAC ratio	**26.4%**	n.a.
TLAC leverage ratio	**8.5%**	n.a.

(1) Capital, RWA, and capital ratios are calculated using OSFI's Capital Adequacy Requirements (CAR) guideline and the Leverage ratio is calculated using OSFI's Leverage Requirements (LR) guideline as updated in accordance with the regulatory guidance issued by OSFI in response to the COVID-19 pandemic. Both the CAR guideline and LR guideline are based on the Basel III framework.
(2) Effective November 1, 2021, OSFI requires Domestic Systemically Important Banks (D-SIBs) to meet minimum risk-based TLAC ratio and TLAC leverage ratio requirements which are calculated using OSFI's TLAC guideline.
(3) The TLAC standard is applied at the resolution entity level which for us is deemed to be Royal Bank of Canada and its subsidiaries. A resolution entity and its subsidiaries are collectively called a resolution group. Both the TLAC ratio and TLAC leverage ratio are calculated using the TLAC available as percentage of total RWA and leverage exposure, respectively.
n.a. not applicable

Note 30 Offsetting financial assets and financial liabilities

Offsetting within our Consolidated Balance Sheets may be achieved where financial assets and liabilities are subject to master netting arrangements that provide the currently enforceable right of offset and where there is an intention to settle on a net basis, or realize the assets and settle the liabilities simultaneously. For derivative contracts and repurchase and reverse repurchase arrangements, this is generally achieved when there is a market mechanism for settlement (e.g., central counterparty exchange or clearing house) which provides daily net settlement of cash flows arising from these contracts. Margin receivables and margin payables are generally offset as they settle simultaneously through a market settlement mechanism.

Amounts that do not qualify for offsetting include master netting arrangements that only permit outstanding transactions with the same counterparty to be offset in an event of default or occurrence of other predetermined events. Such master netting arrangements include the International Swaps and Derivatives Association Master Agreement or certain derivative exchange or clearing counterparty agreements for derivative contracts, global master repurchase agreement and global master securities lending agreements for repurchase, reverse repurchase and other similar secured lending and borrowing arrangements.

The amount of financial collateral received or pledged subject to master netting arrangements or similar agreements but do not qualify for offsetting refers to the collateral received or pledged to cover the net exposure between counterparties by enabling the collateral to be realized in an event of default or the occurrence of other predetermined events. Certain amounts of collateral are restricted from being sold or re-pledged unless there is an event of default or the occurrence of other predetermined events.

Note 30 Offsetting financial assets and financial liabilities (continued)

The following tables provide the amount of financial instruments that have been offset on the Consolidated Balance Sheets and the amounts that do not qualify for offsetting but are subject to enforceable master netting arrangements or similar agreements. The amounts presented are not intended to represent our actual exposure to credit risk.

Financial instruments subject to enforceable master netting arrangements or similar agreements

	As at October 31, 2022							
	Amounts subject to enforceable netting arrangements							
				Related amounts not offset on the Consolidated Balance Sheets (1)				
(Millions of Canadian dollars)	Gross amounts of recognized financial instruments	Gross amounts offset on the Consolidated Balance Sheets	Net amounts presented in the Consolidated Balance Sheets	Impact of master netting agreements	Financial collateral (2)	Net amounts	Amounts not subject to enforceable netting arrangements	Net amounts presented on the Consolidated Balance Sheets
Financial assets								
Assets purchased under reverse repurchase agreements and securities borrowed	$ 411,937	$ 94,203	$ 317,734	$ 293	$ 314,602	$ 2,839	$ 111	$ 317,845
Derivative assets (3)	146,479	2,185	144,294	98,610	21,412	24,272	10,145	154,439
Other financial assets	1,638	304	1,334	11	83	1,240	–	1,334
	$ 560,054	$ 96,692	$ 463,362	$ 98,914	$ 336,097	$ 28,351	$ 10,256	$ 473,618
Financial liabilities								
Obligations related to assets sold under repurchase agreements and securities loaned	$ 360,722	$ 94,203	$ 266,519	$ 293	$ 265,822	$ 404	$ 7,428	$ 273,947
Derivative liabilities (3)	141,137	2,185	138,952	98,610	19,758	20,584	14,539	153,491
Other financial liabilities	825	304	521	11	–	510	–	521
	$ 502,684	$ 96,692	$ 405,992	$ 98,914	$ 285,580	$ 21,498	$ 21,967	$ 427,959

	As at October 31, 2021							
	Amounts subject to enforceable netting arrangements							
				Related amounts not offset on the Consolidated Balance Sheets (1)				
(Millions of Canadian dollars)	Gross amounts of recognized financial instruments	Gross amounts offset on the Consolidated Balance Sheets	Net amounts presented in the Consolidated Balance Sheets	Impact of master netting agreements	Financial collateral (2)	Net amounts	Amounts not subject to enforceable netting arrangements	Net amounts presented on the Consolidated Balance Sheets
Financial assets								
Assets purchased under reverse repurchase agreements and securities borrowed	$ 384,439	$ 77,028	$ 307,411	$ 101	$ 305,071	$ 2,239	$ 492	$ 307,903
Derivative assets (3)	84,595	314	84,281	57,101	12,978	14,202	11,260	95,541
Other financial assets	412	240	172	1	61	110	–	172
	$ 469,446	$ 77,582	$ 391,864	$ 57,203	$ 318,110	$ 16,551	$ 11,752	$ 403,616
Financial liabilities								
Obligations related to assets sold under repurchase agreements and securities loaned	$ 338,737	$ 77,028	$ 261,709	$ 101	$ 261,135	$ 473	$ 492	$ 262,201
Derivative liabilities (3)	77,514	314	77,200	57,101	10,503	9,596	14,239	91,439
Other financial liabilities	412	240	172	1	–	171	–	172
	$ 416,663	$ 77,582	$ 339,081	$ 57,203	$ 271,638	$ 10,240	$ 14,731	$ 353,812

(1) Financial collateral is reflected at fair value. The amount of financial instruments and financial collateral disclosed is limited to the net balance sheet exposure, and any over-collateralization is excluded from the table.

(2) Includes cash collateral of $20 billion (October 31, 2021 – $12 billion) and non-cash collateral of $116 billion (October 31, 2021 – $107 billion) received for financial assets and cash collateral of $9 billion (October 31, 2021 – $9 billion) and non-cash collateral of $267 billion (October 31, 2021 – $262 billion) pledged for financial liabilities.

(3) Includes cash margin of $3 billion (October 31, 2021 – $3 billion) that was offset against derivative assets and cash margin of $8 billion (October 31, 2021 – $3 billion) that was offset against derivative liabilities on the Consolidated Balance Sheets.

Note 31 Recovery and settlement of on-balance sheet assets and liabilities

The table below presents an analysis of assets and liabilities recorded on our Consolidated Balance Sheets by amounts to be recovered or settled within one year and after one year, as at the balance sheet date, based on contractual maturities and certain other assumptions outlined in the footnotes below. As warranted, we manage the liquidity risk of various products based on historical behavioural patterns that are often not aligned with contractual maturities. Amounts to be recovered or settled within one year, as presented below, may not be reflective of our long-term view of the liquidity profile of certain balance sheet categories.

	As at					
	October 31, 2022			October 31, 2021		
(Millions of Canadian dollars)	Within one year	After one year	Total	Within one year	After one year	Total
Assets						
Cash and due from banks (1)	**$ 71,081**	**$ 1,316**	**$ 72,397**	$ 112,924	$ 922	$ 113,846
Interest-bearing deposits with banks	**108,011**	**–**	**108,011**	79,638	–	79,638
Securities						
Trading (2)	**139,810**	**8,395**	**148,205**	129,206	10,034	139,240
Investment, net of applicable allowance	**26,540**	**143,478**	**170,018**	29,831	115,653	145,484
Assets purchased under reverse repurchase agreements and securities borrowed	**316,714**	**1,131**	**317,845**	307,805	98	307,903
Loans						
Retail	**113,965**	**435,786**	**549,751**	98,946	404,652	503,598
Wholesale	**70,374**	**203,593**	**273,967**	60,099	157,967	218,066
Allowance for loan losses			**(3,753)**			(4,089)
Segregated fund net assets	**–**	**2,638**	**2,638**	–	2,666	2,666
Other						
Customers' liability under acceptances	**17,827**		**17,827**	19,793	5	19,798
Derivatives (2)	**151,928**	**2,511**	**154,439**	93,409	2,132	95,541
Premises and equipment	**59**	**7,155**	**7,214**	28	7,396	7,424
Goodwill	**–**	**12,277**	**12,277**	–	10,854	10,854
Other intangibles	**–**	**6,083**	**6,083**	–	4,471	4,471
Other assets	**66,071**	**14,229**	**80,300**	47,634	14,249	61,883
	$ 1,082,380	**$ 838,592**	**$ 1,917,219**	$ 979,313	$ 731,099	$ 1,706,323
Liabilities						
Deposits (3)	**$ 1,023,324**	**$ 185,490**	**$ 1,208,814**	$ 943,633	$ 157,198	$ 1,100,831
Segregated fund net liabilities	**–**	**2,638**	**2,638**	–	2,666	2,666
Other						
Acceptances	**17,872**	**–**	**17,872**	19,868	5	19,873
Obligations related to securities sold short	**34,105**	**1,406**	**35,511**	35,524	2,317	37,841
Obligations related to assets sold under repurchase agreements and securities loaned	**273,001**	**946**	**273,947**	261,533	668	262,201
Derivatives (2)	**140,808**	**12,683**	**153,491**	89,804	1,635	91,439
Insurance claims and policy benefit liabilities	**1,904**	**9,607**	**11,511**	1,867	10,949	12,816
Other liabilities	**71,689**	**23,546**	**95,235**	48,901	21,400	70,301
Subordinated debentures	**110**	**9,915**	**10,025**	188	9,405	9,593
	$ 1,562,813	**$ 246,231**	**$ 1,809,044**	$ 1,401,318	$ 206,243	$ 1,607,561

(1) Cash and due from banks are assumed to be recovered within one year, except for cash balances not available for use by the Bank.

(2) Trading securities classified as FVTPL and trading derivatives are presented as within one year as this best represents in most instances the short-term nature of our trading activities. Trading securities designated as FVTPL are generally presented based on contractual maturity. Non-trading derivatives are presented according to the recovery or settlement of the hedging transaction.

(3) Demand deposits of $562 billion (October 31, 2021 – $576 billion) are presented as within one year due to their being repayable on demand or at short notice on a contractual basis. In practice, these deposits relate to a broad range of individuals and customer types which form a stable base for our operations and liquidity needs.

Note 32 Parent company information

The following table presents information regarding the legal entity of Royal Bank of Canada with its subsidiaries presented on an equity accounted basis.

Condensed Balance Sheets

	As at	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Assets		
Cash and due from banks	**$ 48,062**	$ 97,617
Interest-bearing deposits with banks	**84,680**	56,896
Securities	**174,615**	153,780
Investments in bank subsidiaries and associated corporations (1)	**49,841**	43,546
Investments in other subsidiaries and associated corporations	**88,260**	80,216
Assets purchased under reverse repurchase agreements and securities borrowed	**132,829**	125,590
Loans, net of allowance for loan losses	**679,580**	601,742
Net balances due from bank subsidiaries (1)	**7,172**	–
Other assets	**227,767**	155,421
	$1,492,806	$1,314,808
Liabilities and shareholders' equity		
Deposits	**$ 955,978**	$ 854,833
Net balances due to bank subsidiaries (1)	**–**	28,201
Net balances due to other subsidiaries	**36,701**	38,309
Other liabilities	**382,099**	285,447
	1,374,778	1,206,790
Subordinated debentures	**9,964**	9,351
Shareholders' equity	**108,064**	98,667
	$1,492,806	$1,314,808

(1) Bank refers primarily to regulated deposit-taking institutions and securities firms.

Condensed Statements of Income and Comprehensive Income

	For the year ended	
(Millions of Canadian dollars)	**October 31 2022**	October 31 2021
Interest and dividend income (1)	**$ 27,791**	$19,793
Interest expense	**12,846**	5,615
Net interest income	**14,945**	14,178
Non-interest income (2)	**5,425**	5,393
Total revenue	**20,370**	19,571
Provision for credit losses	**579**	(606)
Non-interest expense	**10,175**	9,466
Income before income taxes	**9,616**	10,711
Income taxes	**2,276**	2,088
Net income before equity in undistributed income of subsidiaries	**7,340**	8,623
Equity in undistributed income of subsidiaries	**8,454**	7,415
Net income	**$ 15,794**	$16,038
Other comprehensive income (loss), net of taxes	**5,810**	1,463
Total comprehensive income	**$ 21,604**	$17,501

(1) Includes dividend income from investments in subsidiaries and associated corporations of $1 million (October 31, 2021 – $5 million).

(2) Includes a nominal share of profit (loss) from associated corporations (October 31, 2021 – nominal).

Condensed Statements of Cash Flows

(Millions of Canadian dollars)	For the year ended October 31 2022	October 31 2021
Cash flows from operating activities		
Net income	**$ 15,794**	$ 16,038
Adjustments to determine net cash from operating activities:		
Change in undistributed earnings of subsidiaries	**(8,454)**	(7,415)
Change in deposits, net of securitizations	**101,145**	72,196
Change in loans, net of securitizations	**(78,288)**	(46,194)
Change in trading securities	**(10,348)**	(8,756)
Change in obligations related to assets sold under repurchase agreements and securities loaned	**24,133**	5,228
Change in assets purchased under reverse repurchase agreements and securities borrowed	**(7,239)**	8,447
Change in obligations related to securities sold short	**3,024**	2,405
Other operating activities, net	**2,385**	6,316
Net cash from (used in) operating activities	**42,152**	48,265
Cash flows from investing activities		
Change in interest-bearing deposits with banks	**(27,784)**	(35,293)
Proceeds from sales and maturities of investment securities	**59,304**	70,260
Purchases of investment securities	**(71,509)**	(73,150)
Net acquisitions of premises and equipment and other intangibles	**(1,180)**	(1,093)
Change in cash invested in subsidiaries	**(2,514)**	(3,078)
Change in net funding provided to subsidiaries	**(36,981)**	(12,068)
Net cash from (used in) investing activities	**(80,664)**	(54,422)
Cash flows from financing activities		
Issuance of subordinated debentures	**1,000**	2,750
Repayment of subordinated debentures	**–**	(2,500)
Issue of common shares, net of issuance costs	**51**	90
Common shares purchased for cancellation	**(5,426)**	–
Issue of preferred shares and other equity instruments, net of issuance costs	**749**	2,245
Redemption of preferred shares and other equity instruments	**(155)**	(1,475)
Dividends paid on shares and distributions paid on other equity instruments	**(6,960)**	(6,420)
Repayment of lease liabilities	**(302)**	(313)
Net cash from (used in) financing activities	**(11,043)**	(5,623)
Net change in cash and due from banks	**(49,555)**	(11,780)
Cash and due from banks at beginning of year	**97,617**	109,397
Cash and due from banks at end of year	**$ 48,062**	$ 97,617
Supplemental disclosure of cash flow information		
Amount of interest paid	**$ 7,801**	$ 6,306
Amount of interest received	**21,332**	17,831
Amount of dividends received	**2,618**	2,185
Amount of income taxes paid	**4,641**	1,772

Note 33 Subsequent events

Acquisition

On November 29, 2022, we entered into an agreement to acquire 100% of the common shares of HSBC Bank Canada (HSBC Canada) for an all-cash purchase price of $13.5 billion. In addition, we will purchase all of the existing preferred shares and subordinated debt of HSBC Canada held directly or indirectly by HSBC Holdings plc at par value ($2.1 billion as of September 30, 2022). HSBC Canada is a premier Canadian personal and commercial bank focused on globally connected clients.

The transaction is expected to close by late 2023 and is subject to the satisfaction of customary closing conditions, including regulatory approvals. The results of the acquired business will be consolidated from the date of close.

Table of Contents

Ten-year statistical review

Condensed Balance Sheets

(Millions of Canadian dollars) (1)	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Assets										
Cash and due from banks	**$ 72,397**	$ 113,846	$ 118,888	$ 26,310	$ 30,209	$ 28,407	$ 14,929	$ 12,452	$ 17,421	$ 15,550
Interest-bearing deposits with banks	**108,011**	79,638	39,013	38,345	36,471	32,662	27,851	22,690	8,399	9,039
Securities, net of applicable allowance (2)	**318,223**	284,724	275,814	249,004	222,866	218,379	236,093	215,508	199,148	182,710
Assets purchased under reverse repurchase agreements and securities borrowed	**317,845**	307,903	313,015	306,961	294,602	220,977	186,302	174,723	135,580	117,517
Loans, net of allowance	**819,965**	717,575	660,992	618,856	576,818	542,617	521,604	472,223	435,229	408,850
Other	**280,778**	202,637	216,826	189,459	173,768	169,811	193,479	176,612	144,773	126,079
Total assets	**$ 1,917,219**	$ 1,706,323	$ 1,624,548	$ 1,428,935	$ 1,334,734	$ 1,212,853	$ 1,180,258	$ 1,074,208	$ 940,550	$ 859,745
Liabilities										
Deposits (3)	**$ 1,208,814**	$ 1,100,831	$ 1,011,885	$ 886,005	$ 836,197	$ 789,036	$ 757,589	$ 697,227	$ 614,100	$ 563,079
Other (3)	**590,205**	497,137	516,029	449,490	409,451	340,124	341,295	305,675	264,088	239,763
Subordinated debentures	**10,025**	9,593	9,867	9,815	9,131	9,265	9,762	7,362	7,859	7,443
Total liabilities	**$ 1,809,044**	$ 1,607,561	$ 1,537,781	$ 1,345,310	$ 1,254,779	$ 1,138,425	$ 1,108,646	$ 1,010,264	$ 886,047	$ 810,285
Equity attributable to shareholders	**108,064**	98,667	86,664	83,523	79,861	73,829	71,017	62,146	52,690	47,665
Non-controlling interest	**111**	95	103	102	94	599	595	1,798	1,813	1,795
Total equity	**108,175**	98,762	86,767	83,625	79,955	74,428	71,612	63,944	54,503	49,460
Total liabilities and equity	**$ 1,917,219**	$ 1,706,323	$ 1,624,548	$ 1,428,935	$ 1,334,734	$ 1,212,853	$ 1,180,258	$ 1,074,208	$ 940,550	$ 859,745

Condensed Income Statements

(Millions of Canadian dollars) (1)	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Net interest income (3)	**$ 22,717**	$ 20,002	$ 20,835	$ 19,749	$ 17,952	$ 16,926	$ 16,531	$ 14,771	$ 14,116	$ 13,249
Non-interest income (3), (4)	**26,268**	29,691	26,346	26,253	24,624	23,743	22,264	20,932	19,992	17,433
Total revenue (4)	**48,985**	49,693	47,181	46,002	42,576	40,669	38,795	35,703	34,108	30,682
Provision for credit losses (5)	**484**	(753)	4,351	1,864	1,307	1,150	1,546	1,097	1,164	1,237
Insurance policyholder benefits, claims and acquisition expense	**1,783**	3,891	3,683	4,085	2,676	3,053	3,424	2,963	3,573	2,784
Non-interest expense (4)	**26,609**	25,924	24,758	24,139	22,833	21,794	20,526	19,020	17,661	16,214
Net income	**$ 15,807**	$ 16,050	$ 11,437	$ 12,871	$ 12,431	$ 11,469	$ 10,458	$ 10,026	$ 9,004	$ 8,342

Other Statistics – reported

(Millions of Canadian dollars, except percentages and per share amounts) (1)	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
PROFITABILITY MEASURES										
Earnings per shares – basic	**$ 11.08**	$ 11.08	$ 7.84	$ 8.78	$ 8.39	$ 7.59	$ 6.80	$ 6.75	$ 6.03	$ 5.53
– diluted	**$ 11.06**	$ 11.06	$ 7.82	$ 8.75	$ 8.36	$ 7.56	$ 6.78	$ 6.73	$ 6.00	$ 5.49
Return on common equity (6), (7)	**16.4%**	18.6%	14.2%	16.8%	17.6%	17.0%	16.3%	18.6%	19.0%	19.7%
Return on risk-weighted assets	**2.68%**	2.90%	2.10%	2.52%	2.55%	2.49%	2.34%	2.45%	2.52%	2.67%
Efficiency ratio (4)	**54.3%**	52.2%	52.5%	52.5%	53.6%	53.6%	52.9%	53.3%	51.8%	52.8%
KEY RATIOS										
PCL on impaired loans as a % of average net loans and acceptances (8)	**0.10%**	0.10%	0.24%	0.27%	0.20%	0.21%	0.28%	0.24%	0.27%	0.31%
Net interest margin (average earning assets, net) (3), (6)	**1.48%**	1.48%	1.55%	1.61%	1.64%	1.69%	1.70%	1.71%	1.86%	1.88%
SHARE INFORMATION										
Common shares outstanding (000s) – end of period	**1,382,911**	1,424,525	1,422,473	1,430,096	1,438,794	1,452,535	1,484,235	1,443,955	1,443,125	1,441,722
Dividends declared per common share	**$ 4.96**	$ 4.32	$ 4.29	$ 4.07	$ 3.77	$ 3.48	$ 3.24	$ 3.08	$ 2.84	$ 2.53
Dividend yield (9)	**3.7%**	3.8%	4.7%	4.1%	3.7%	3.8%	4.3%	4.1%	3.8%	4.0%
Dividend payout ratio	**45%**	39%	55%	46%	45%	46%	48%	46%	47%	46%
Book value per share (10)	**$ 72.85**	$ 64.57	$ 56.75	$ 54.41	$ 51.12	$ 46.41	$ 43.32	$ 39.51	$ 33.69	$ 29.87
Common share price (RY on TSX) (11)	**$ 126.05**	$ 128.82	$ 93.16	$ 106.24	$ 95.92	$ 100.87	$ 83.80	$ 74.77	$ 80.01	$ 70.02
Market capitalization (TSX) (11)	**174,316**	183,507	132,518	151,933	138,009	146,554	124,476	107,925	115,393	100,903
Market price to book value	**1.73**	2.00	1.64	1.95	1.88	2.17	1.93	1.89	2.38	2.34
CAPITAL MEASURES – CONSOLIDATED										
Common Equity Tier 1 capital ratio	**12.6%**	13.7%	12.5%	12.1%	11.5%	10.9%	10.8%	10.6%	9.9%	9.6%
Tier 1 capital ratio	**13.8%**	14.9%	13.5%	13.2%	12.8%	12.3%	12.3%	12.2%	11.4%	11.7%
Total capital ratio	**15.4%**	16.7%	15.5%	15.2%	14.6%	14.2%	14.4%	14.0%	13.4%	14.0%
Leverage ratio	**4.4%**	4.9%	4.8%	4.3%	4.4%	4.4%	4.4%	4.3%	n.a.	n.a.

(1) Effective November 1, 2019, we adopted IFRS 16 *Leases*. Results from periods prior to November 1, 2019 are reported in accordance with IAS 17 *Leases* in this 2022 Annual Report. Effective November 1, 2018, we adopted IFRS 15 *Revenue from Contracts with Customers*. Results from periods prior to November 1, 2018 are reported in accordance with IAS 18 *Revenue* in this 2022 Annual Report. Effective November 1, 2017, we adopted IFRS 9 *Financial Instruments* (IFRS 9). Results from periods prior to November 1, 2017 are reported in accordance with IAS 39 *Financial Instruments: Recognition and Measurement* (IAS 39) in this 2022 Annual Report.

(2) Securities are comprised of trading and investment securities. Under IFRS 9, investment securities represent debt and equity securities at FVOCI and debt securities at amortized cost, net of the applicable allowance. Under IAS 39, investment securities represented available-for-sale securities and held-to-maturity securities.

(3) Commencing Q4 2019, the interest component and the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in trading revenue and deposits, respectively are presented in net interest income and other liabilities respectively. As at November 1, 2016, comparative amounts have been reclassified to conform with this presentation.

(4) Effective Q4 2017, service fees and other costs incurred in association with certain commissions and fees earned are presented on a gross basis in non-interest expense. As at November 1, 2014, comparative amounts have been reclassified to conform with this presentation.

(5) Under IFRS 9, PCL relates primarily to loans, acceptances, and commitments, and also applies to all financial assets except for those classified or designated as FVTPL and equity securities designated as FVOCI. Prior to the adoption of IFRS 9, PCL related only to loans, acceptances, and commitments. PCL on loans, acceptances, and commitments is comprised of PCL on impaired loans (Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39) and PCL on performing loans (Stage 1 and Stage 2 PCL under IFRS 9 and PCL on loans not yet identified as impaired under IAS 39).

(6) Average amounts are calculated using methods intended to approximate the average of the daily balances for the period. This includes Average common equity used in the calculation of ROE. For further details, refer to the Key performance and non-GAAP measures section of the MD&A.

(7) This measure may not have a standardized meaning under generally accepted accounting principles (GAAP) and may not be comparable to similar measures disclosed by other financial institutions. For further details, refer to the Key performance and non-GAAP measures section of the MD&A.

(8) PCL on impaired loans represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39. Stage 3 PCL under IFRS 9 is comprised of lifetime credit losses of credit-impaired loans, acceptances and commitments.

(9) Defined as dividends per common share divided by the average of the high and low share price in the relevant period.

(10) Calculated as common equity divided by the number of common shares outstanding at the end of the period.

(11) Based on TSX closing market price at period-end.

n.a. not applicable

Principal subsidiaries

(Millions of Canadian dollars)

Principal subsidiaries (1)	Principal office address (2)	As at October 31, 2022 Carrying value of voting shares owned by the Bank (3)
Royal Bank Holding Inc.	Toronto, Ontario, Canada	**$ 77,914**
RBC Direct Investing Inc.	Toronto, Ontario, Canada	
RBC Insurance Holdings Inc.	Mississauga, Ontario, Canada	
RBC Life Insurance Company	Mississauga, Ontario, Canada	
R.B.C. Holdings (Bahamas) Limited	Nassau, New Providence, Bahamas	
RBC Caribbean Investments Limited	George Town, Grand Cayman, Cayman Islands	
Royal Bank of Canada Insurance Company Ltd.	Camana Bay, Grand Cayman, Cayman Islands	
Investment Holdings (Cayman) Limited	George Town, Grand Cayman, Cayman Islands	
RBC (Barbados) Funding Ltd.	St. Michael, Barbados	
Capital Funding Alberta Limited	Calgary, Alberta, Canada	
RBC Global Asset Management Inc.	Toronto, Ontario, Canada	
RBC Investor Services Trust	Toronto, Ontario, Canada	
RBC Investor Services Bank S.A.	Esch-sur-Alzette, Luxembourg	
RBC (Barbados) Trading Bank Corporation	St. James, Barbados	
RBC U.S. Group Holdings LLC (2)	Toronto, Ontario, Canada	**27,655**
RBC USA Holdco Corporation (2)	New York, New York, U.S.	
RBC Capital Markets, LLC (2)	New York, New York, U.S.	
City National Bank	Los Angeles, California, U.S.	
RBC Dominion Securities Limited	Toronto, Ontario, Canada	**13,535**
RBC Dominion Securities Inc.	Toronto, Ontario, Canada	
Royal Bank Mortgage Corporation	Toronto, Ontario, Canada	**5,604**
RBC Europe Limited	London, England	**2,669**
The Royal Trust Company	Montreal, Quebec, Canada	**1,215**
Royal Trust Corporation of Canada	Toronto, Ontario, Canada	**486**

(1) The Bank directly or indirectly controls each subsidiary.

(2) Each subsidiary is incorporated or organized under the laws of the state or country in which the principal office is situated, except for RBC U.S. Group Holdings LLC and RBC USA Holdco Corporation which are incorporated under the laws of the State of Delaware, U.S. and RBC Capital Markets, LLC, which is organized under the laws of the State of Minnesota, U.S.

(3) The carrying value of voting shares is stated as the Bank's equity in such investments.

Shareholder Information

Corporate headquarters
Street address:
Royal Bank of Canada
200 Bay Street
Toronto, Ontario M5J 2J5
Canada
Tel: 1-888-212-5533

Mailing address:
P.O. Box 1
Royal Bank Plaza
Toronto, Ontario M5J 2J5
Canada
website: rbc.com

Transfer Agent and Registrar
Main Agent:
Computershare Trust Company of Canada
1500 Robert-Bourassa Blvd.
Suite 700
Montreal, Quebec H3A 3S8
Canada
Tel: 1-866-586-7635 (Canada and the U.S.) or 514-982-7555 (International)
Fax: 514-982-7580
website: computershare.com/rbc

Co-Transfer Agent (U.S.):
Computershare Trust Company, N.A.
250 Royall Street
Canton, Massachusetts 02021
U.S.A.

Co-Transfer Agent (U.K.):
Computershare Investor Services PLC
Securities Services – Registrars
P.O. Box 82, The Pavilions,
Bridgwater Road,
Bristol BS99 6ZZ
U.K.

Stock exchange listings
(Symbol: RY)

Common shares are listed on:
Canada – Toronto Stock Exchange (TSX)
U.S. – New York Stock Exchange (NYSE)
Switzerland – Swiss Exchange (SIX)

Preferred shares AZ, BB, BD, BF, BH, BI and BO are listed on the TSX. The related depository shares of the series C-2 preferred shares are listed on the NYSE.

Valuation day price
For Canadian income tax purposes, Royal Bank of Canada's common stock was quoted at $29.52 per share on the Valuation Day (December 22, 1971). This is equivalent to $7.38 per share after adjusting for the two-for-one stock split of March 1981 and the two-for- one stock split of February 1990. The one-for-one stock dividends in October 2000 and April 2006 did not affect the Valuation Day amount for our common shares.

Shareholder contacts
For dividend information, change in share registration or address, lost stock certificates, tax forms, estate transfers or dividend reinvestment, please contact:
Computershare Trust Company of Canada
100 University Avenue, 8th Floor
Toronto, Ontario M5J 2Y1
Canada

Tel: 1-866-586-7635 (Canada and the U.S.) or 514-982-7555 (International)
Fax: 1-888-453-0330 (Canada and the U.S.) or 416-263-9394 (International)
email: service@computershare.com

Financial analysts, portfolio managers, institutional investors
For financial information inquiries, please contact:
Investor Relations
Royal Bank of Canada
200 Bay Street
South Tower
Toronto, Ontario M5J 2J5
Canada
Tel: 416-955-7808
email: invesrel@rbc.com
or visit our website at rbc.com/investorrelations

Direct deposit service
Shareholders in Canada and the U.S. may have their common share dividends deposited directly to their bank account by electronic funds transfer. To arrange for this service, please contact our Transfer Agent and Registrar, Computershare Trust Company of Canada.

Eligible dividend designation
For purposes of the *Income Tax Act* (Canada) and any corresponding provincial and territorial tax legislation, all dividends (and deemed dividends) paid by RBC to Canadian residents on both its common and preferred shares, are designated as "eligible dividends", unless stated otherwise.

Common share repurchases
We are engaged in a normal course issuer bid (NCIB) which allows us to repurchase for cancellation up to 45 million common shares during the period spanning from December 8, 2021 to December 7, 2022, when the bid expires, or such earlier date as we may complete the purchases pursuant to our Notice of Intention to Make a NCIB filed with the Toronto Stock Exchange.

We determine the amount and timing of purchases under the NCIB, subject to prior consultation with the Office of the Superintendent of Financial Institutions. For further details, refer to the Capital management section.

A copy of our Notice of Intention to Make a NCIB may be obtained, without charge, by contacting our Corporate Secretary at our Toronto mailing address.

2023 Quarterly earnings release dates

First quarter	March 1
Second quarter	May 25
Third quarter	August 24
Fourth quarter	November 30

2023 Annual Meeting
The Annual Meeting of Common Shareholders will be held on Wednesday, April 5, 2023.

Dividend dates for 2023
Subject to approval by the Board of Directors

	Record dates	Payment dates
Common and preferred shares series AZ, BB, BD, BF, BH, BI and BO	January 26 April 25 July 26 October 26	February 24 May 24 August 24 November 24
Preferred shares series C-2 (US$)	January 27 April 28 July 28 October 27	February 7 May 8 August 8 November 7
Preferred shares series BT	February 15 August 17	February 24 August 24

Governance
Summaries of the significant ways in which corporate governance practices followed by RBC differ from corporate governance practices required to be followed by U.S. domestic companies under the NYSE listing standards are available on our website at rbc.com/governance.

Information contained in or otherwise accessible through the websites mentioned in this report to shareholders does not form a part of this report. All references to websites are inactive textual references and are for your information only.

Trademarks used in this report include the LION & GLOBE Symbol, ROYAL BANK OF CANADA, RBC, RBC CAPITAL MARKETS, RBC FUTURE LAUNCH, RBC GLOBAL ASSET MANAGEMENT, RBC INSURANCE, RBC HOMELINE PLAN, RBC PAYEDGE, RBC TECH FOR NATURE, RBC VANTAGE, RBC WEALTH MANAGEMENT, RBCx, MYADVISOR, InvestEase, AIDEN, OWNR, NOMI, NOMI INSIGHTS, NOMI FIND & SAVE Dr. Bill, MYDOH, Avion Rewards, RBCxMUSIC, AVION, and VANTAGE SNAPSHOT which are trademarks of Royal Bank of Canada used by Royal Bank of Canada and/or by its subsidiaries under license. All other trademarks mentioned in this report which are not the property of Royal Bank of Canada, are owned by their respective holders.

Exhibit 3

Consent of Independent Registered Public Accounting Firm

We hereby consent to the incorporation by reference in this Annual Report on Form 40-F for the year ended October 31, 2022 of Royal Bank of Canada of our Report of Independent Registered Public Accounting Firm dated November 29, 2022, relating to the consolidated financial statements and the effectiveness of internal control over financial reporting, which appears in Exhibit 2 incorporated by reference in this Annual Report on Form 40-F.

We also consent to the incorporation by reference in the Registration Statements on Form S-8 Nos. 333-12036, 333-12050, 333-13052, 333-13112, 333-117922, 333-207754, 333-207750, 333-207748 and 333-252536, and on Form F-3 No. 333-259205 of Royal Bank of Canada of our Report of Independent Registered Public Accounting Firm dated November 29, 2022 referred to above.

We also consent to the reference to us under the heading “Experts,” which appears in the Annual Information Form included in Exhibit 1 incorporated by reference in this Annual Report on Form 40-F, which is incorporated by reference in such Registration Statements.

/s/ PricewaterhouseCoopers LLP

Chartered Professional Accountants, Licensed Public Accountants
Toronto, Canada
November 30, 2022

RBC Code of Conduct

A Message from David McKay
President and CEO

Building trust by speaking up and doing the right thing

At RBC, holding ourselves to the highest standards of integrity plays a critical role in achieving our Purpose to help clients thrive and communities prosper, and our Vision to be among the world's most trusted and successful financial institutions.

In short, how we do things is just as important as what we do.

Our Values and our Code of Conduct guide us and set expectations for our behaviour and decision-making. Our Code is the roadmap we follow to serve our clients with the highest standards of integrity. It also lays the foundation for how we work together in a respectful, transparent and fair environment.

Guided by our Leadership Model, we are each responsible for speaking up and doing the right thing to protect and enhance RBC's reputation and put our clients first. We all have a duty to report actual or possible misconduct and the right to be treated with dignity and respect when we do. And that includes speaking up, challenging and reporting unethical behaviour when it occurs, without fear of retaliation.

Together, we can foster a culture that's built on trust, dignity and respect for all.

Please read the Code carefully, discuss what it means with your manager and colleagues, and ask questions to ensure you understand it and what it requires of you.

Our success depends on these principles. And it starts with each one of us.

David McKay, President and CEO

Our Vision and Values

RBC's Values define what we stand for everywhere we do business. They are reflected in our behaviour and the way we build relationships and deliver value to all our clients, employees, shareholders, communities and others we deal with. Guided by our shared Values and united in a common purpose, we can achieve our strategic goals and accomplish great results.

We demonstrate our Vision – **To be Among the World's Most Trusted and Successful Financial Institutions –** by living our Values in the decisions and actions we take every day. These five Values set the tone for our culture and unify us across geographies and businesses:

CLIENT FIRST: We will always earn the right to be our clients' first choice

- Put client needs above our own whatever our role, to build lasting relationships
- Listen with empathy, understand client needs to offer the right advice and solutions
- Bring the best of RBC to deliver excellent value and differentiated client experiences

COLLABORATION: We win as One RBC.

- Believe in each other and trust in teamwork and colleagues' intentions
- Share knowledge, listen and teach to learn and achieve more together
- Look beyond ourselves to see the bigger picture for opportunities and solutions

ACCOUNTABILITY: We take ownership for personal and collective high performance.

- Be bolder, reach higher, act with courage to realize potential and make a difference
- Own it; seek out accountability and empowerment to grow and excel
- Be curious and learn continuously to build skills and careers

DIVERSITY & INCLUSION: We embrace diversity for innovation and growth.

- Speak up for inclusion and empower people to grow and achieve more
- Seek out and respect different perspectives to challenge conventional approaches
- Identify and act on the opportunities and needs that client diversity brings

INTEGRITY: We hold ourselves to the highest standards to build trust.

- Be respectful, transparent and fair in all relationships
- Stand up for what we believe; speak with candour; constructively challenge
- Build trust of clients, colleagues and community partners by listening to and understanding their interests and needs

At RBC we bring these Values to life every day – continuing to earn the trust of RBC's clients and each other and ensuring our strong reputation for doing what's right.

Table of Contents

1. LIVING OUR VALUES 1
1.1 ACTING WITH INTEGRITY – DOING WHAT'S RIGHT 1
1.2 OUR SHARED COMMITMENT AND ACCOUNTABILITY 2
1.2.1 APPROVAL OF THE CODE 2
1.2.2 WAIVERS 2
2. SPEAKING UP 3
2.1 SPEAKING UP, ASKING QUESTIONS AND CONSTRUCTIVELY CHALLENGING 3
2.2 REPORTING MISCONDUCT 3
2.3 INVESTIGATIONS, INQUIRIES AND REVIEWS 4
2.4 RBC'S COMMITMENT TO NON-RETALIATION 4
2.5 WHAT WE EXPECT OF OUR PEOPLE MANAGERS 4
3. INTEGRITY IN DEALING WITH RBC CLIENTS, COMMUNITIES AND OTHERS 6
3.1 PROTECTING RBC CLIENT INFORMATION 6
3.2 PROTECTING RBC BUSINESS INFORMATION 6
3.3 PROTECTING RBC'S REPUTATION IN OUR COMMUNITIES 7
3.4 RESPONDING TO GOVERNMENT OR REGULATORY INQUIRIES 9
3.5 ACCESSIBILITY AT RBC 9
4. INTEGRITY IN WORKING TOGETHER AT RBC 11
4.1 RESPECTFUL WORKPLACE 11
4.2 EQUAL OPPORTUNITY, FAIR WORKPLACE AND HUMAN RIGHTS 12
4.3 PERSONAL INFORMATION ABOUT US 13
4.4 WORKPLACE HEALTH AND SAFETY 13
5. INTEGRITY IN HOW WE DO BUSINESS 15
5.1 BUSINESS DEALINGS 15
5.2 AVOIDING AND MANAGING CONFLICTS OF INTEREST 15
5.2.1 MANAGING OUR CLOSE PERSONAL RELATIONSHIPS IN RBC DEALINGS 16
5.2.2 MANAGING CLOSE PERSONAL RELATIONSHIPS AT WORK 17
5.2.3 MANAGING OUTSIDE ACTIVITIES AND EXTERNAL DIRECTORSHIPS 17
5.2.4 MANAGING GIFTS AND ENTERTAINMENT 18
5.2.5 MANAGING INSIDE INFORMATION AND SECURITIES TRADING 19
5.2.6 ACCEPTING APPOINTMENTS OR INHERITANCES 20
5.3 PREVENTING FINANCIAL CRIME 21
5.4 FAIR COMPETITION 22
5.5 GLOBAL ECONOMIC SANCTIONS 23
6. INTEGRITY IN SAFEGUARDING ENTRUSTED ASSETS 24
6.1 PROTECTING RBC CLIENT PROPERTY 24
6.2 PROTECTING RBC PROPERTY 24
6.3 KEEPING ACCURATE BOOKS AND RECORDS 26
7. CONCLUSION 28

1. Living Our Values

1.1 Acting with Integrity – Doing What's Right

RBC is a values-based organization. Our respect for and our commitments to our clients, shareholders, communities and each other are rooted in our Values. RBC's Code of Conduct (the "Code") incorporates RBC's Values, and in particular our Value of Integrity, to guide our day-to-day actions and decisions so we can always do the right thing.

Throughout the Code, "RBC" means Royal Bank of Canada and all its subsidiaries.

Every day our actions demonstrate not only our Value of always earning the right to be our clients' first choice, but also our personal commitments. We each have a responsibility to be truthful, respect others and comply with laws, regulations and RBC's policies (in the Code, the word "policy" includes policies, procedures, standards, standing orders and frameworks). Over many years RBC has earned trust and a reputation for doing what's right through the actions of those who work here. A continued strong focus on doing what's right will sustain and build on that trust — the cornerstone of the financial services industry and our relationships with clients and communities.

We do business across the globe, and each one of us has a responsibility to behave with integrity so that we can continue to serve clients and generate value for RBC's shareholders. More than simply being aware of our Values and following our Code, we need to make them an integral part of how we operate day to day. This will ensure we tell the truth, respect others, uphold the law, speak up to challenge what we believe is wrong, and comply with policies and practices. Our foundation is based on acting with integrity and doing what's right.

For resources and information, visit Doing What's Right on RBCNet.

Tell the truth
Our work places us in a position of trust. RBC clients, shareholders, communities and our colleagues rely on us to be honest and do business responsibly. We do what we say we will do and earn the trust and loyalty of our clients, shareholders, communities and colleagues.

Respect others and treat them fairly
Showing respect for everyone we work with and the clients we serve, treating them fairly and taking personal responsibility for high performance enable us to achieve RBC's strategic goals. By living our Values and following the Code, we show others we honour the trust they place in us — making RBC a great place to work and do business.

Uphold the law
RBC is subject to the laws of the countries where we do business. RBC's policies are designed to comply with its legal and regulatory obligations, including the intent and spirit of the laws that apply to it. By doing so, RBC maintains its reputation for acting with integrity. To this end, each of us must understand and comply with RBC's policies and practices that apply to the way we do our jobs. Keep in mind that breaking the law could result in civil, criminal and regulatory penalties, including fines, for RBC and the individual involved, as well as damage to both RBC's and the individual's reputation.

Speak up to challenge and do what's right
Constructively challenging decisions and behaviour helps ensure we continue to live our Values in our work at RBC. Seeking out constructive challenge when we make business decisions helps ensure those decisions are right for RBC – and clients, colleagues, shareholders and communities.

Comply with policies and instructions
We are each responsible for knowing and following the RBC policies that apply to us. We must also comply with managers' instructions unless they are inconsistent with RBC Values or policies, are against the law or result in health and safety risks. In these circumstances, or if we are unsure about the right thing to do, we should raise our concerns with one of the Key Contacts.

We must always be aware of both enterprise and local policies specific to business or geographic areas and work within the boundaries of what we have been authorized to do.

1.2 Our Shared Commitment and Accountability

The Code applies to all RBC employees, contract workers and members of the boards of directors of Royal Bank of Canada and all its subsidiaries.

Understanding and complying with the Code is a condition of our work at RBC, and critical to earning each other's trust, as well as the trust of our clients and communities. The Code helps to protect our personal integrity and reputation as well as the integrity and reputation of RBC and the financial services industry as a whole.

Any one of us who breaches, or fails to report an actual or possible breach of, the Code will be subject to corrective or disciplinary action.

Corrective or disciplinary action is RBC's response to unacceptable behaviour, including breaches of the Code, and can range from reprimands and impact on performance ratings and compensation, to termination of our working relationship with RBC.

We also expect RBC third party suppliers to follow similar principles and share our commitment to ethics and integrity as set out in our Supplier Code of Conduct.

1.2.1 Approval of the Code

The Board of Directors of Royal Bank of Canada approves the Code.

1.2.2 Waivers

Waivers of the Code, or any of its provisions, are seldom granted. If a waiver is necessary to accommodate exceptional circumstances, it must be approved by RBC's Chief Human Resources Officer and RBC's Chief Risk Officer. A waiver of the Code for Royal Bank of Canada directors, executive officers or specified officers must be approved by Royal Bank of Canada's Board of Directors (or a designated Board committee) and disclosed publicly, as required by law and RBC policies.

2. Speaking Up

Acting with integrity involves more than just personally complying with the Code. It also means we speak up for the good of RBC and that all concerns are heard.

When deciding whether to speak up and raise concerns, we should ask ourselves these questions:

- Does something feel wrong about this situation? Is it legal? Is this unfair, unethical or discriminatory?
- How will this situation or decision affect others? How would RBC clients, colleagues or third parties view or be affected by this situation?
- What are the possible consequences of our actions or inaction?
- Could this situation damage RBC's reputation?

2.1 Speaking Up, Asking Questions and Constructively Challenging

While the Code and RBC policies outline the ethical behaviour expected of us, they cannot anticipate every situation we encounter. By speaking up and asking questions, we ensure RBC does the right thing and we protect our clients' interests and assets, RBC's reputation and each other. If we need guidance, have questions or are unsure about the right thing to do, we should speak with our manager, senior management or one of the Key Contacts.

2.2 Reporting Misconduct

We have a duty to report actual, or possible, misconduct that we become aware of, even our own. This includes speaking up about conduct that is, or may be, in violation of the Code, policies and laws, or is otherwise unethical and could put RBC at risk of loss or harm. There are a number of reporting channels we can use to report misconduct. We can notify our managers, senior management, Human Resources, Compliance, or we can report through the Conduct Hotline. The Conduct Hotline also provides us with the option to report anonymously.

Those of us who receive a report of misconduct are expected to promptly engage other Key Contacts and Human Resources, as appropriate, to assist with the review and investigation of the report.

All reports of misconduct are taken seriously and investigated promptly and thoroughly, as appropriate. RBC keeps the identity of the person making the report and the details confidential, and will only disclose this information to the extent necessary to investigate and address the situation or as legally required.

Refer to RBC Standards on Reporting Misconduct and the Speak Up! webpage for further details.

Some examples of misconduct are:

- deliberate failure to comply with policies, management instructions or the law
- disrespectful behaviour, discrimination, harassment, racism and actual or threatened violence
- misappropriation (including fraud, theft and kiting), improper use of company or client assets or systems, and improper sales reporting
- promoting products and services to clients inappropriately

- inappropriate client referrals, failing to report unusual client transactions and inappropriate use or disclosure of client information
- inappropriate social media use
- failing to disclose, manage and, if necessary, eliminate conflicts of interest, and
- insider trading.

2.3 Investigations, Inquiries and Reviews

At times we may be asked to participate in an internal or external investigation, inquiry or review of concerns or possible misconduct. We have a duty to cooperate and provide honest, accurate, complete and timely information. Where requests are made by an external party, we must notify our manager or local Compliance group before providing information.

2.4 RBC's Commitment to Non-Retaliation

There will be no retaliation for asking questions, speaking up and making a truthful report of actual or possible misconduct, participating in an investigation or exercising our legal rights. Retaliation can include behaviour or actions that punish or deter someone from speaking up, and must be reported. If you believe you or someone else has encountered any form of retaliation, contact one of the channels listed on the Speak Up! webpage to ensure the situation is addressed promptly.

Our commitment to non-retaliation means RBC:

- investigates every claim of retaliation
- follows up with employees who raise concerns
- reviews performance ratings and compensation decisions made in relation to those who report misconduct to ensure no retaliation
- provides education and coaching on retaliation to managers of employees who raise concerns, and
- takes disciplinary action to address retaliation.

Some examples of retaliation are:

- an unwarranted adverse action affecting someone's compensation, job security, career mobility or performance rating
- excluding someone from meetings or team events, or
- withholding relevant work-related information.

Some examples of activities that are not retaliation are:

- disciplinary action for misconduct
- managing performance, and
- routine coaching.

2.5 What We Expect of Our People Managers

While we are all held to the high ethical standards set out in our Values and the Code, those of us who are people managers are accountable for leading by example. This includes:

- promoting our teams' awareness and understanding of RBC's Values, the Code and our policies to ensure ongoing compliance

- demonstrating RBC's high standards for integrity by behaving in a way that reflects our Values, both in and outside the workplace
- being respectful, transparent and fair in all relationships
- maintaining an environment that prohibits retaliation, where everyone feels safe to ask questions, raise concerns and report misconduct, and respecting the privacy of those who do, and
- promptly escalating concerns and reports of possible or actual misconduct as required, and following up to ensure they are addressed.

3. Integrity in Dealing with RBC Clients, Communities and Others

We are committed to promoting fairness in our dealings with our clients, communities, shareholders, third parties and others, carefully weighing our responsibilities to all.

We are in a relationship business and we pride ourselves on the quality of the service, advice and products we provide RBC clients. Integrity and trust help us better serve RBC clients, and we make sure we put their interests above our own. The same applies to the communities where we live and work, making us a company that people want to do business with and work for.

3.1 Protecting RBC Client Information

Clients care deeply about the privacy of the information they share with us. Protecting their information and keeping their trust is integral to the financial services industry. It's also central to our culture of doing what's right. We each have a duty to keep RBC client information confidential and secure from the risk of theft, loss, misuse, or improper access or disclosure. We do this by complying with the RBC Enterprise Privacy Risk Management Policy. Unless legally required, we must also never share client information — accidentally or intentionally — with a third party or colleague who does not have a business need to know. We are responsible for and trusted with keeping RBC client information private, even after we leave RBC's service. This includes returning all client information in our possession to RBC.

In the event of a privacy breach, we must follow established procedures. We must immediately report a potential or actual privacy breach in our Privacy "Report an Incident" tool to engage our local Privacy Officer, and we must never share any details about the breach with others who do not have a business need to know. For more information, please refer to the RBC Enterprise Privacy Risk Management Policy.

3.2 Protecting RBC Business Information

RBC's business information is one of our most important assets, so we have a duty to safeguard it by complying with RBC information security policies.

For more information, please refer to the RBC Enterprise Information Security Policy and "Proprietary Information" in section 6.2 below.

What can I do to protect RBC business or client information?

- Never access or use client information to benefit ourselves, our families, our friends, or for any purpose unrelated to the performance of our duties.
- Operate on a "need to know" rather than "nice to know" basis, and share RBC business or client information only with those who need it for an appropriate business purpose.
- Always use proper procedures to share information securely.
- Avoid working in public places.
- When working from home or off-site, ensure RBC business or client information is not overheard, visible or left behind.
- Dispose of confidential information securely.

- Never use your non-RBC personal email address or other non-approved tools, platforms or applications to receive, forward or send business or client information.
- Immediately report any potential or actual privacy or information security incidents or breaches.

3.3 Protecting RBC's Reputation in Our Communities

Individual character and personal activities
We must avoid any conduct or association which could bring our honesty, integrity or judgment into question. It's important to understand how closely our clients, shareholders, communities and colleagues associate us with RBC, even when we are off-duty, and how our off-duty conduct impacts RBC's reputation and brand. We are required to disclose immediately to our manager or Human Resources when we are charged with, and again if we are convicted of, any criminal offence, unless prohibited by local law. Managers should contact Human Resources to seek further guidance. We are held to RBC's Values and the standards set out in the Code, both on- and off-duty, and our duty to report actual or possible misconduct applies equally when we're off-duty.

"Off-duty" conduct can become an issue when it:

- damages RBC's reputation (e.g. you post a disparaging social media comment about your colleague's abilities)
- impedes our ability to perform our duties (e.g. a mobile employee has their driver's licence revoked and cannot drive to see clients), or
- brings our integrity and Values into question (e.g. cyber-bullying or harassing a colleague off hours).

External representation

Our Values and the Code provide a foundation for our behaviour when we represent RBC at work and in our communities. Our integrity and trust must be beyond reproach.

- **Business and corporate use of external social media**
  One of the ways RBC communicates is through social media. To ensure our business and corporate social media use is appropriate and consistent with RBC's general communication strategy, only employees specifically approved for business use may participate in the external social media channels approved by their RBC unit. Refer to the RBC Enterprise Policy on the Use of External Social Media, which includes links to additional business specific documents and definitions of business and corporate use.

- **Personal use of social media**
  When we participate in social media in a personal capacity, we must consider the potential impact our personal posts may have on RBC's reputation, and be guided by our Values and the standards set out in the Code. While social media can be used to create greater awareness and promote RBC's brand, it is not an appropriate venue to express concerns about RBC, our clients, colleagues or the competition which could be resolved more constructively through one of the channels listed on RBC's Speak Up! webpage. Confidential, non-public information relating to RBC and its clients must never be shared in our public or private social media conversations. For more guidance on personal use of social media, refer to the RBC Enterprise Guidelines for Personal Use of Social Media.

When using any social media platform, remember that our comments are public and permanent. We should follow the practices below when using social media.

Do:

- identify yourself as an RBC employee when posting about RBC on your personal social media accounts; for example #RBCemployee or #MyCompany
- follow your business segment's or functional unit's Social Media Standard (where applicable) and the RBC Enterprise Guidelines for Personal Use of Social Media, and
- contact socialmedia@rbc.com if you have questions or concerns or for guidance when using personal social media accounts to promote RBC products or services.

Do Not:

- post on social media if our personal and professional reputations, or the reputation of RBC, may be negatively impacted
- post content about our colleagues or other individuals without prior consent
- include confidential, non-public information relating to RBC, RBC clients, employees, contract workers or other people in our social media conversations. Some examples include RBC's financial information, client and employee personal information, business plans or strategies, pending product launches, partnerships with third parties and employment relationships
- try to address an issue involving RBC unfolding in social media, or speak on RBC's behalf, unless authorized by Corporate Communications and our manager
- use third party content without permission, or
- use RBC's trademarks in the name of a group or community on social media without seeking permission.

- **RBC public endorsements and influencer marketing**
  An influencer is anyone who publicly talks or posts about RBC (e.g. including products, services, promotions and charitable events) through any channel (e.g. including personal social media or online channels) and has a connection with RBC. A connection can include an employment relationship, receipt of an incentive (e.g. payment, gift or benefit) or a family or close personal relationship with an employee. It is misleading if an influencer does not disclose their connection to RBC because it can change a viewer's perception of an endorsement. For more guidance, refer to the RBC Enterprise Endorsement and Influencer Marketing Policy.

Some examples of influencers:

- Employees
- Members of the board of directors of RBC or any of its subsidiaries
- Endorsers (e.g. celebrities, athletes or other third parties)
- Reviewers
- Bloggers
- Those with whom we have a family or a close personal relationship

- **Responding to inquiries from the media**
  We manage and protect RBC's reputation and ensure consistency in managing media inquiries. To ensure consistency and accuracy, only those of us who have been authorized to do so may communicate with the media on RBC's behalf. Media inquiries must be promptly referred to our Corporate Communications representatives; we are not authorized to address media questions ourselves. For more information, refer to the RBC Media and Communications Standards.

Supporting our communities
We support the communities where we live, work and do business. We also accept accountability for the social and economic effects of our business decisions. We take pride in the value of our contributions and encourage employee involvement in the community.

We must obtain our manager's permission to solicit for or promote causes or issues, including charitable ones, in RBC workplaces. Personal involvement in our communities must be at our own expense and must not interfere with our work at RBC or RBC's operations, and may require manager permission depending on the activity. Refer to the RBC Conflicts of Interest Control Standards for Outside Business Activities and External Directorships for more information.

Environmental sustainability
RBC promotes environmental sustainability. This means minimizing our environmental footprint and offering environmentally responsible products and services. We believe fulfilling our goals in these areas will lead to short- and long-term benefits for RBC shareholders, clients, colleagues and the communities where we live and do business.

Political involvement and contributions
We support participation in general political processes and respect our colleagues' diverse opinions.

We must not use RBC time or resources to promote political candidates or causes, either inside or outside the workplace. If we choose to participate in political activity, we do so on our own behalf, at our own expense, and not as representatives of RBC. We must never use our affiliation with RBC to market our political activities.

It is important to note that certain jurisdictions impose restrictions on political contributions and/or engagement, including volunteer activities, by corporations and/or employees of companies. Employees should review various jurisdictional laws, regulations, and/or policies before making a political contribution. If we have any questions, we should ask our manager and/or Compliance.

3.4 Responding to Government or Regulatory Inquiries
From time to time, we may receive an inquiry from government authorities or regulators regarding RBC business. When approached for information, we must follow the procedures established for our business unit. This includes escalating the inquiry to our manager or local Compliance group, as appropriate, for response.

3.5 Accessibility at RBC
At RBC, we are committed to removing barriers to promote dignity, independence and equal opportunity in the workplace and in the products and services we offer. We must always take steps to ensure that clients, employees, contract workers, job applicants and directors of Royal Bank of Canada are treated fairly and with dignity and respect, taking into account their accessibility needs. Refer to the Enterprise Accessibility Guidelines or visit Accessibility at RBC for more information.

How can we ensure we provide an inclusive environment for persons with accessibility needs?

- Speak appropriately and respectfully with and about any person with a disability (whether visible or non-visible), emphasizing the person first, not the disability.
- Seek to understand the potential needs of others.
- Provide accessible premises, equipment, technology and services, where reasonable or required by applicable legislation.

4. Integrity in Working Together at RBC

At RBC, we have a strong and capable global team serving our clients, working together to deliver on our strategy, and creating value and growth for our clients, communities and shareholders. We believe in each other and have confidence and trust in the capabilities and intentions of our colleagues. Our integrity, diversity & inclusiveness, and collaboration help make RBC a great place to work, belong and thrive.

4.1 Respectful Workplace

We all have a right to work in an environment that is respectful and professional. Mutual respect and dignity ensure an environment that is healthy and productive for RBC employees, clients and others we interact with.

We must all behave in a way that contributes to a workplace free from discrimination, disrespectful and inappropriate behaviour, harassment, sexual harassment, violence and retaliation.

Harassment, including sexual harassment, discrimination, violence, retaliation, and other disrespectful and inappropriate behaviour – whether or not it's intentional – are not tolerated at RBC. Harassment is any course of action, behaviour or comments that, because of their nature or persistence, are known, or would reasonably be considered, to interfere with an individual's professionalism or create an offensive, hostile or intimidating workplace. We must ensure that an individual's physical and mental well-being is not impacted negatively while also not undermining the integrity of our relationship with RBC and one another.

Maintaining a respectful workplace also requires us to behave professionally while using RBC systems. We must not use RBC networks, systems, devices or access to the Internet to view or communicate inappropriate material.

Keep in mind, respecting confidences and refraining from gossiping about our colleagues is a matter of personal integrity. However, if we become aware of information regarding a possible Code breach, we are required to Speak Up! and report any misconduct.

Refer to RBC's Respectful Workplace Policy for additional information.

Examples of harassment include:

- intimidating, threatening or coercing another individual
- bullying, which is a persistent pattern of mistreatment of others that causes harm (e.g. spreading rumours or gossiping, humiliating, ostracizing or negatively using influence to control another person's conduct)
- unwelcome physical contact
- intruding on an individual's privacy, including speculating or outing someone on any grounds of discrimination, and
- offensive or demeaning statements or behaviour (e.g. micro-aggressions, stereotypes, social marginalization) about a person or group, related to any form of discrimination.

Sexual harassment is a specific form of harassment that includes unwelcome behaviour such as:

- unwelcome advances, flirtation, propositions, invitations for sexual favours
- sexual physical contact
- verbal comments, actions or gestures of a sexual nature
- sexist behaviour that represents a belief that one gender is inferior to the other
- disseminating sexually suggestive or explicit pictures, cartoons, objects or jokes
- conversations or inquiries about sexual exploits or desires, or using lewd language
- explicitly or implicitly making submission to sexual behaviour a term or condition of employment, or
- using the submission to, or rejection of, sexual behaviour as a basis for employment decisions.

Not all negative interactions are harassment, discrimination or retaliation. For example,

- minor conflicts that arise because of differences in work or communication styles, and general disagreements and challenges are not harassment
- managing performance and other manager activities that are part of their responsibilities and performed for legitimate business purposes are not harassment, discrimination or retaliation, and
- constructive challenge that encourages the exchange of ideas is not harassment.

Examples of disrespectful and inappropriate behaviour are:

- excessive swearing or shouting
- swearing or shouting directed at others
- circulating, posting or making demeaning comments, gestures, pranks or jokes
- circulating or posting derogatory or offensive pictures, posters or communications, and
- conduct that embarrasses or degrades another based on personal characteristics (e.g. body shaming, socio-economic status shaming)

Speak UP!

- If you witness or experience inappropriate behaviour, you have a responsibility to report it in a timely manner to a manager, your Human Resources contact or through the Conduct Hotline.
- Early, informal and direct communication with the person whose behaviour you feel is inappropriate is encouraged where you feel comfortable doing so. Oftentimes, this is a helpful way to address the conduct quickly and effectively.
- If you decide not to talk directly to the person, or the conduct continues, you must raise your concern with a manager or one of the Key Contacts. Refer to Doing What's Right.
- The duty to report does not prevent you from pursuing other processes available by law to report concerns.

4.2 Equal Opportunity, Fair Workplace and Human Rights

Equal opportunity
RBC promotes equal opportunity in all dealings with RBC employees, contract workers, clients and others we deal with. In addition, RBC provides equal opportunity for advancement and growth in the workplace by filling open positions based on business need, candidate merit and RBC Values.

Fair workplace
We treat all employees and contract workers fairly, pay fair compensation and provide respectful work environments. All employees are encouraged to raise concerns directly within RBC using any of the Key Contacts.

Human rights
We comply with all laws and relevant international guiding principles regarding non-discrimination and human rights in the jurisdictions where we operate. We strive to avoid causing or contributing to adverse human rights impacts through our own business activities, and aim to prevent or mitigate adverse impacts that we may be directly linked to, by taking appropriate action. We also expect our employees, contract workers and RBC third party suppliers to share our commitment to respect human rights.

RBC prohibits discrimination on the grounds of age, national origin, citizenship, ethnicity, race, colour, religion or creed, physical or mental disability, veteran status, family status, pregnancy, marital status, civil or same sex union, biological sex (including intersex), sexual orientation, gender identity, gender expression or any other characteristic protected by law.

Even where laws allow for discrimination on these grounds, RBC operates in a way that treats people fairly.

4.3 Personal Information About Us

Those of us who work at RBC have a right to privacy. Personal information about each of us is confidential.

Keeping information private and confidential is a matter of personal integrity, honouring the trust others place in us. Collection, use and disclosure of this information must be relevant to our working relationship with RBC, and compliant with relevant laws, the Code and RBC's policies. For more information, please refer to RBC's Employee Privacy Notice.

Some examples of personal information RBC maintains as confidential are:

- information required to verify credentials and education
- date of birth
- employment-related credit and other background checks
- home address
- home phone number and personal cell phone number
- government-issued identification numbers
- diversity data
- compensation
- performance reviews
- corrective/disciplinary actions, and
- health and benefit information and insurance records

4.4 Workplace Health and Safety

RBC is committed to providing a healthy and safe workplace and complying with health and safety laws. Maintaining such a workplace is a shared responsibility of RBC and its employees and contract workers. All employees and contract workers are to take every reasonable and necessary precaution to ensure their health and safety as well as those of their colleagues. A workplace includes all RBC premises and any other place where work related activity occurs, including work related social events and business travel.

To ensure our workplaces are healthy and safe, we understand and follow RBC's health and safety policies. We also:

- do not have weapons of any kind in our possession while on RBC premises, and
- obtain management approval and any required permits before arranging events or serving alcohol on RBC premises.

5. Integrity in How We Do Business

Ethical behaviour governs every aspect of our business, from day-to-day transactions to special projects.

5.1 Business Dealings

As representatives of RBC, we have a duty to never mislead others — even by omission — about products or services we offer. We must be mindful in our communications to provide information that is clear, simple and not misleading in any way. We must make every reasonable effort to provide full and fair information and correct errors or ambiguity in any statement made on RBC's behalf. This is especially important with regard to our sales representations, marketing and advertising.

We ensure our sales practices are fair and not misleading by ensuring that we:

- are knowledgeable about the products and services we recommend to clients
- recommend products and services based on an understanding of a client's needs and never for personal gain or to meet performance incentive goals or other targets
- clearly and accurately explain the terms and conditions outlined, and give appropriate disclosures about a product or service in clear, simple and not misleading language
- are not pressuring or coercing our clients for any reason, and
- obtain proper and informed consent from our clients in line with RBC's policies.

5.2 Avoiding and Managing Conflicts of Interest

By acting in a way that puts RBC and our clients' interests above our personal interests, we can assure RBC stakeholders of our integrity. This means that the decisions we make in our work with RBC must be made independently of our own interests.

Obligations arising from our other business, family and social relationships must not play a role in our work for RBC. A conflict of interest — actual, potential or perceived — is a situation that could cause others to doubt our ability to perform our jobs effectively and objectively. Keep in mind that a conflict of interest can exist even where we have behaved properly and ethically. Even the impression of a conflict of interest can affect RBC's reputation and our own. We must think about how our actions would look to others. Just because we don't perceive our situation to be a conflict, doesn't mean others share the same view.

Conflicts often arise where there is a personal interest that could compromise our objectivity (i.e. a personal conflict), but also where there may be conflicting interests between RBC and third parties (i.e. a corporate conflict). Even where there is no opportunity for personal gain in a situation, we must consider whether RBC's interest may conflict with a client's. Irrespective of the type, we have an ongoing responsibility to identify, disclose, manage and, if necessary, eliminate conflicts of interest in relation to RBC, its clients and its third parties.

What are some scenarios that present actual, potential or perceived conflicts of interest?

- Borrowing money from or lending money (including co-signing or being a guarantor of loans) to other RBC employees, contract workers or clients, unless the amount is nominal

- Using your position at RBC to promote an outside organization or business
- Using your position at RBC to inappropriately influence any employees or transactions
- Working on behalf of RBC in any transaction or business relationship where you, your family or someone you have a close personal relationship with has a personal or financial interest
- Processing a transaction for another employee without exercising the same due diligence as you would for any other RBC client
- Excessive or irresponsible gambling that could place an employee in financial difficulty

What are some examples of corporate conflicts?

- An RBC analyst conducts securities research on a company that is intended to provide an objective opinion on those securities, while also being in possession of inside information about another client that could influence their opinion
- An employee offers entertainment to a regulatory agency that has oversight of RBC

Some conflicts arise by virtue of certain types of relationships we have, while others are a result of engaging in certain activities. Common conflicts of interest are described in the following sections. Note that in these sections *"*family*"* includes:

- a spouse, common-law partner or domestic partner
- children and step-children
- parents and siblings
- grandparents and grandchildren, and
- other relatives by blood or marriage.

We must make sure we read and understand the RBC Enterprise Conflicts of Interest Policy and related control standards as well as the RBC Enterprise Anti-Bribery Anti-Corruption Policy. These resources explain how to disclose actual, potential or perceived conflicts with external parties. Where we are unsure about a potential conflict or need more information, we should check with our local Compliance group. Where the conflict relates to another RBC employee, we should speak with our manager or contact Human Resources for guidance as needed. Directors of Royal Bank of Canada should check with the Corporate Secretariat. Non-employee directors of subsidiaries should check with the Subsidiary Governance Office.

5.2.1 Managing Our Close Personal Relationships in RBC Dealings

It is important that we handle our financial dealings responsibly, with integrity and in compliance with RBC policies.

We often use RBC products and services ourselves, as do many of our friends and family members. We must make sure all our personal, family and friend dealings with RBC are handled at arm's length – independent of their relationship to us and our relationship with RBC – by following relevant procedures for the business we work in.

Likewise, our loyalties can become conflicted if friends or family members work for a company that does or seeks to do business with RBC as an RBC client or third party. This is especially likely to be a problem if it happens to those of us who are involved in the approval or selection process, contract negotiations or relationship management with RBC clients or third parties. In these cases, we must inform our manager or local Compliance group so the conflict can be addressed.

5.2.2 Managing Close Personal Relationships at Work

It is possible for our close personal relationships to have an effect on our work at RBC. We must understand the actual or perceived effects that close personal relationships may have in order to avoid situations that would reflect negatively on RBC.

It's important to identify and disclose immediately if we will be working with family or others who we are in a close personal relationship with so conflicts can be appropriately managed or avoided.

Remember, there is no substitute for good judgment and common sense. If we are ever in doubt about a relationship that may put us in a conflict of interest, we should speak with our manager or Human Resources.

What are some examples of "close personal relationships"?

- Family
- Romantic or intimate relationships
- Household members such as roommates
- Close friends
- Persons with whom we have a significant financial relationship (e.g. business partner or co-investor)

What types of close personal relationships could cause a conflict of interest and must be disclosed so they can be appropriately managed or avoided?

- A supervisory relationship with a family member or someone we are in a close personal relationship with
- Any working relationship with a family member or someone we are in a close personal relationship with where we may have, or be perceived to have, the ability to impact compensation, work or promotion prospects

5.2.3 Managing Outside Activities and External Directorships

Some of us take on additional activities or roles outside of our work at RBC. For example, we may work part-time elsewhere, run a personal business from home or take on a directorship, officer position or similar role at another company, organization, club, association or foundation. No matter the activity or role, it must not be with one of RBC's competitors. It must also not compromise our ability to do our best work and fulfill our responsibilities to RBC or its clients.

We must be aware of actual, potential or perceived conflicts of interest and potential reputational issues related to outside activities and external directorships, and must comply with the Code and RBC policies on disclosure and approval. Doing so allows us to maintain our commitment to integrity while maximizing our business and relationships.

The following may be considered competitors of RBC:

- Banks
- Credit unions
- Asset management firms
- Insurance companies
- Mortgage companies
- Trust companies

- Certain financial technology companies (i.e. FinTech)
- Other companies that provide financial services

Even if an outside activity or external directorship is not with a direct competitor of RBC, conflicts of interest may still arise if the activity or role directly relates to or overlaps with our work at RBC (for example, subject matter, job function, technical expertise).

For more information on managing outside activities or work and managing external directorships, refer to the RBC Enterprise Conflicts of Interest Policy and the RBC Conflicts of Interest Control Standards for Outside Business Activities and External Directorships for the required process and approvals. Directors of Royal Bank of Canada should refer to the Policies and procedures – Conflicts of interest section in the *Royal Bank of Canada Director's Guide* and consult the Corporate Secretariat. Non-employee directors of subsidiaries should refer to the *RBC Policy on the Legal Governance of Subsidiaries* and consult the Corporate Secretary of the relevant subsidiary.

5.2.4 Managing Gifts and Entertainment

In business, it is common to foster relationships and show appreciation by exchanging courtesies such as meals, gifts and entertainment. However, we must ensure that the gifts and entertainment we accept are not intended or designed to influence our business judgment on behalf of RBC. Likewise, we must never give gifts or entertainment intended to inappropriately influence or create a sense of obligation to those we have a business relationship with. To keep our purposes clear, all gifts and entertainment we accept or give must comply with RBC policies and be customary and consistent with usual business practices.

RBC policies and business practices require that all gifts and entertainment given or received, with certain exceptions (such as gifts and entertainment of a nominal value or promotional gifts), be approved and recorded by the RBC unit's management. We must take extra caution when the intended recipient of a gift or entertainment is a public official.

Gifts are anything of value given or received in relation to RBC business. We may only give or accept gifts that are customary, modest and culturally sensitive. We must never accept or give cash, cash equivalents, bonds or negotiable securities, although gift certificates or gift cards are allowed as long as their intended purpose is for the purchase of what would otherwise be considered a gift.

Key things to remember when considering gifts or entertainment:

- Cash, bonds and negotiable securities are never acceptable gifts regardless of the amount.
- The RBC Conflicts of Interest Control Standards for Gifts and Entertainment sets out limits for gifts, as set out below. Note that the annual cumulative limits that an employee may give to (or receive from) the same client or third party recipient should not exceed:
- $100 CAD in Canada
- $100 USD in the United States
- £100 GBP in the United Kingdom
- €100 Euro in Europe, and
- in all other jurisdictions, the local currency equivalent to 100 Canadian dollars.

- Entertainment must not seem excessive or inappropriate; if unsure, seek guidance from your manager or Compliance before accepting an invitation.
- You must seek guidance from the RBC Law Group or your local Anti-Bribery Anti-Corruption Group before providing a gift or entertainment to, or accepting any gifts or entertainment from, a public official.
- Gifts and entertainment must not create a sense of obligation for either party – it's never wrong to question the motive behind business gifts and entertainment.
- Follow your RBC unit's specific rules regarding gifts or entertainment, including recordkeeping.
- Gifts or entertainment between employees must never be given in exchange for a business referral, to influence or to gain another form of business advantage now or in the future.

Entertainment includes any event we host or attend for business related purposes. Common examples include meals, sporting events, theatrical performances and educational events. Entertainment should always be in good taste and consistent with usual business practice. As with gifts, we must avoid entertainment that is lavish or too expensive because it may also be seen to influence our judgment.

If only one party attends the event, it is considered a gift rather than entertainment. For example, if a third party gives us tickets to an event, but does not attend, we must follow our local RBC unit process for gifts from a third party. The same would be true if RBC offers entertainment to a third party, but no one from RBC attends the event. Employees who are invited by a supplier to attend an RBC sponsored event as a gift may be subject to a different approval process and requirements. Refer to the RBC Conflicts of Interest Control Standards for Gifts and Entertainment or your local RBC unit policy.

RBC has restrictions on payment and acceptance of payment of travel or lodging expenses. These apply to situations where RBC is providing entertainment or where we are accepting travel or lodging expenses from a third party.

In all cases, we must comply with the RBC Enterprise Conflicts of Interest Policy, the RBC Conflicts of Interest Control Standards for Gifts and Entertainment and the RBC Enterprise Anti-Bribery Anti-Corruption Policy. Your RBC unit may also have more specific rules; for further information you should contact your local Compliance group.

5.2.5 Managing Inside Information and Securities Trading

From time to time, we may have access to material,non-public information ("inside information") about a company, including RBC, or its clients. As a rule, inside information can reasonably be expected to affect the market value or price of a company's securities, or considered important to a reasonable investor's investment decision. Having inside information offers an unfair advantage when deciding whether to buy, sell or hold onto a security. As a result, many of the countries where we do business have laws regarding when we can trade in securities issued by any company.

When we have inside information about a company, we must notify Compliance immediately to ensure that the potential conflict is managed appropriately. In addition, we must not trade in the securities of that company. Doing so is called "insider trading" – which is illegal and subject to fines and penalties. It is also illegal to provide inside information to another (this is usually called "tipping") unless it is necessary to accomplish a legitimate business purpose. Employees should be familiar with information barriers and other tools outlined in RBC policies, which are used to manage conflicts.

Many of our investment activities, even where they are not illegal, may still pose personal conflicts that must be managed or eliminated in accordance with RBC policies. Regardless of whether we have access to or possess inside information, we are all subject to the requirements of RBC personal trading policies. Before trading in the securities of RBC, its clients or any other company, we must familiarize ourselves with these requirements, as well as the effect that the perception of wrongdoing may have.

For more information, refer to the RBC Conflicts of Interest Control Standards for Personal Trading and the RBC Conflicts of Interest Control Standards for Inside Information and Information Barriers, as well as applicable local or business specific policies.

Directors of Royal Bank of Canada should refer to the *Insider Trading and Reporting Policy and Procedures for Directors of Royal Bank of Canada.*

Non-executive directors of Royal Bank of Canada's subsidiaries who are not officers, employees or directors of Royal Bank of Canada should refer to the Policy on Inside Information and Personal Trading for Non-Executive Directors of Subsidiaries of Royal Bank of Canada.

Key things to remember when engaging in securities transactions and trading:

- All employees need pre-approval for personal investments in private companies, be it a small family business or a larger company.
- Never accept favoured share allotments for initial public offerings that are a result of a relationship you have with a company through RBC.
- It doesn't matter how you come to possess inside information, you are always obligated to protect it in accordance with RBC policies and applicable laws.
- Be particularly mindful when trading in RBC securities, as there might be additional restrictions.

5.2.6 Accepting Appointments or Inheritances

RBC's clients look to us for advice on their financial matters. Clients may ask or appoint us to represent them or their interests in a variety of situations. These appointments include our acting as attorneys, mandataries, trustees, executors, administrators, liquidators, protectors, and in other appointments or fiduciary roles. In some instances, clients wish to show their appreciation for the value of our services by giving us a gift effective on their death. These can be made in the client's will, by designation as beneficiary under a client's policy, plan or account, or by joint ownership of an asset.

To make sure there is no actual, potential or perceived conflict of interest, we and our families must not accept these requests, appointments, gifts or benefits unless they arise independently of the client relationship. If a request, appointment, gift or benefit does not arise independently of the client relationship, but we believe that special circumstances apply, we must follow established procedures before we or our families accept it. Management and local Compliance approvals, appropriate for the business we work in, are required. When acceptance of certain appointments is part of our role (such as being a discretionary investment manager), we must also follow RBC policies.

5.3 Preventing Financial Crime

Money laundering, terrorist financing, bribery and corruption, and tax evasion are serious crimes that have damaging effects on global economies, countries, communities and businesses. Global efforts to prevent these crimes receive significant attention from regulators, governments, international organizations and law enforcement agencies.

RBC is committed to doing business based on the quality of our reputation and the services we provide, and not because we have gained any dishonest or unfair advantage. RBC supports efforts to detect and prevent these financial crimes through our commitment to operate with integrity. It is very important that we know and comply with all applicable laws and RBC policies designed to prevent and detect these crimes.

Reporting financial crimes
We must be vigilant and exercise good judgment when dealing with unusual or suspicious transactions or activities. If we know of or suspect or have any concerns relating to money laundering, terrorist financing, bribery and corruption, tax evasion or criminal activity, we must report them as soon as possible to our manager or one of the Key Contacts. We must also never advise ("tip-off") anyone we suspect of committing these crimes.

For more information or guidance, please refer to the RBC Enterprise Control Standards on Anti-Money Laundering and Anti-Terrorist Financing, the RBC Enterprise Anti-Bribery Anti-Corruption Policy and the RBC Conflicts of Interest Control Standards for Gifts and Entertainment.

What can I do to identify and prevent money laundering or terrorist financing?

- Obtain current and adequate Know Your Client information for all client relationships.
- Be aware of AML risks and report concerns every time you observe unusual or suspicious activity.
- Never knowingly assist anyone to transfer the proceeds of crime or alter, remove or disguise information to facilitate a transaction that would otherwise be prohibited under the law.

What can I do to prevent bribery and corruption?

- Never knowingly facilitate any transaction associated with the proceeds of bribery and corruption.
- Never solicit, give, receive or promise anything of value, either directly or indirectly, with the intent of helping RBC obtain an inappropriate advantage. This includes offering, providing or receiving excessive or inappropriate gifts and entertainment.
- Never make facilitation payments. These are typically small payments made to government officials to obtain or speed up routine actions or services such as obtaining licences or permits.

What can I do to prevent tax evasion?

- Follow RBC's Know Your Client procedures to understand the source and use of a client's funds and affairs. If you suspect tax evasion or inappropriate tax reporting, escalate the matter to your manager and AML Compliance contact. Refer to the RBC Enterprise Control Standards on Anti-Money Laundering and Anti-Terrorist Financing for more information on when and how to escalate.
- Do not knowingly facilitate or ignore tax evasion, either in connection with RBC's corporate tax affairs or in servicing our clients. If you are aware of any such behaviour at RBC, report it through one of the channels listed on RBC's Speak Up! webpage.

5.4 Fair Competition

RBC seeks to ensure fair business practices are followed wherever we do business. Many countries where we do business have laws to promote fair competition and reduce monopolistic (or anti-competitive) activity.

At RBC, each of us has a responsibility to know and comply with applicable competition and anti-trust laws. We need to be able to recognize and avoid situations that may conflict with these laws. To ensure we comply with these laws, we must be especially careful when dealing with competitors of RBC. Never agree or arrange with a competitor to do any of the following directly or indirectly:

- fix, maintain, increase or try to control the price of a product or service
- divide or allocate sales, clients, suppliers or markets for the supply, or acquisition of, products or services, or
- fix, maintain, increase, lessen, prevent, eliminate or otherwise try to control the production or supply of a product or service.

We must take great care at industry association meetings or other events where we may interact with competitors. If a discussion appears to be leading into prohibited areas, we must voice our concern, withdraw from the discussion and immediately advise local Compliance or the RBC Law Group. While industry associations can provide excellent opportunities for networking and business development, they pose challenges as well. When attending events, we must be careful to avoid even the appearance that RBC participates in or endorses unfair or manipulative business conduct.

For more information, please refer to RBC's Anti-trust and Competition Law Policy.

Other examples of activities where competition issues arise:

- Bid-rigging or secretly making agreements with other bidders when submitting bids or tenders
- Tied selling or making the availability of a product or service conditional on the purchase of another product or service
- Communications that could be interpreted to show an anti-competitive intent or behaviour, such as advertisements that are misleading, unfair or inaccurate when they compare RBC products with those of our competitors
- Benchmarking or exchanging information with competitors, particularly where the information could raise possible concerns relating to conspiracy, bid-rigging, illegal trade practices or anti-competitive agreements
- Any other act that is likely to harm competition substantially if done in circumstances where RBC is an important participant in a market or a class of business

5.5 Global Economic Sanctions

As a regulated financial institution, RBC must comply with economic sanctions in Canada and other jurisdictions where we operate. We must be aware of any economic sanctions that may apply and their impact to RBC and RBC clients. Further, we must not knowingly avoid sanction regulations, either personally or in servicing our clients. Contact the RBC Law Group or Global Economic Sanctions team for advice if you are unsure of the right course of action.

For more information, please refer to RBC's Enterprise Economic Sanctions Policy.

6. Integrity in Safeguarding Entrusted Assets

As a financial institution, we manage the assets in our care responsibly and ethically to earn and maintain our stakeholders' trust.

6.1 Protecting RBC Client Property

In order to earn RBC clients' trust, we must safeguard their property. This property should be used only in accordance with their directions, relevant RBC policy and the law. Using client property inappropriately or for personal gain is a violation of this trust.

6.2 Protecting RBC Property

Fraud, misappropriation and misuse

Many of us have access to premises, systems and information about RBC processes that are not available to RBC clients or the general public. We must never use this access or information to benefit ourselves, our families or our friends, or for any purpose unrelated to the performance of our duties. Fraud, misappropriation of property or corporate opportunities and other types of misuse are never tolerated.

Acts of fraud may include intentionally concealing or misrepresenting facts for the purpose of inducing, deceiving or misleading others.

Some examples of fraud are:

- improper financial reporting (such as improper revenue recognition and over- or understating assets or liabilities)
- deliberate failure to fulfill our disclosure obligations, and
- falsifying records (such as forging client or management signatures).

"Misappropriation" includes theft or other intentional misuse of RBC assets, systems, processes or RBC client funds. Misuse can include any purpose not related to the performance of our duties.

Some examples of misappropriation and misuse are:

- intentional personal use of RBC expense accounts or corporate credit cards — expense accounts and corporate credit cards must be used only for expenses eligible for reimbursement under RBC's expense guidelines
- unauthorized "borrowing" and "kiting" (taking advantage of the time delay required for an item to clear)
- obtaining funds through false pretences such as depositing a cheque known to be NSF (Non- Sufficient Funds) or making an "empty envelope deposit" in an automated banking machine
- allowing others to benefit from opportunities only available to RBC employees
- making unauthorized changes to a client profile, and
- submitting false benefit claims.

Proprietary information
RBC proprietary information includes non-public or undisclosed information we withhold from general knowledge. This information is critical to our business, and could be useful to our competitors or harmful to RBC if disclosed.

Some examples of proprietary information are:

- RBC client lists and trade secrets
- technical and statistical information
- financial documents
- contract documentation
- legal or business matters
- business processes, and
- corporate strategies and plans.

RBC's proprietary information may be disclosed to outside parties only if required by law or if properly authorized. Authorization can often be obtained through a confidentiality agreement. Our responsibility to safeguard RBC's proprietary information continues, even after we leave RBC's service. This includes returning all proprietary information in our possession to RBC.

Trademarks, copyright and other intellectual property
RBC intellectual property has important commercial value and is crucial to RBC's effective competition in the marketplace. It includes any of the following that we create while working for RBC:

- inventions, improvements, works of authorship, developments, concepts or ideas
- data, processes, online websites or applications, computer software programs, or discoveries, and
- trade secrets, trademarks, brand names, copyrights or logos.

Any intellectual property we generate in our RBC work belongs to RBC and remains with RBC after we leave RBC's service. We should use RBC intellectual property only as permitted in this Code and RBC policies.

RBC intellectual property must not be used by a third party without RBC's prior approval. Similarly, we may use a third party's intellectual property only with the third party's prior approval. For example, all original musical, artistic and literary works, computer software, performances and sound recordings are protected by copyright laws. We must not download, install or copy any such material to our RBC-issued computers or devices without first obtaining the owner's permission.

We should seek guidance from the RBC Law Group if we suspect RBC intellectual property has been infringed upon or otherwise misused, or if we have any questions on the use of intellectual property.

Proper use of RBC networks, systems software, devices, applications and the Internet
We must comply with the Code, RBC policies and any terms and conditions governing the use of RBC equipment, systems, computer networks, applications, software, computers and portable devices, as well as the messages communicated within them. Where RBC policies permit us to use our personal equipment for RBC work, we must follow the policies associated with that use.

When sending communications through RBC networks, we must always maintain a professional tone and comply with the Code and RBC policies, including the Respectful Workplace Policy. We must follow these requirements whether we are using RBC equipment or our own.

In addition, when we conduct work for RBC on any device or network, we must only use electronic messaging channels approved and provided by RBC and the applicable RBC units.

RBC reserves the right to monitor, audit and inspect our use of RBC systems and technology, including internet usage and email. While we may use RBC equipment, systems and technology for personal reasons, we must always comply with the Code and RBC policies, including the Respectful Workplace Policy, and our personal use must be reasonable. In line with this policy, we must not use these systems to view or communicate inappropriate material. These systems also must not be used to do work on behalf of another business or organization, unless authorized by RBC.

Some examples of inappropriate material are:

- sexually explicit material
- gambling websites
- derogatory jokes, and
- offensive or demeaning statements or images about a person or group, including those that relate to race, religion, disability, sexual orientation or gender.

Some examples of electronic messaging channels, all of which need to be approved and provided by RBC before using for RBC work, are:

- email
- instant messaging/chat, including chats in deal rooms or other third party applications
- mobile SMS
- any application that can be downloaded and installed from an app store, and
- social media communication tools like LinkedIn, Facebook and YouTube.

6.3 Keeping Accurate Books and Records

RBC's credibility depends on the integrity of its books, records and accounting. Clients rely on us to maintain and provide accurate records of their dealings with us – a duty RBC takes seriously. We must ensure RBC's books and records are accurate, timely and complete, and reflect RBC's business, operations, earnings and financial status.

To maintain accurate books and records, we follow internal processes and procedures. This includes capturing information in the proper system and labelling it correctly so it is complete and accurate.

We are expected to act honestly and with integrity in handling RBC accounts at all times. For instance, overstating an amount on an expense report or falsifying a sales record in order to exceed a target would be a serious violation of RBC's trust in us and the Code. We must also never mischaracterize a payment in order to hide its true purpose (such as disguising a bribe as a "sales fee" or legitimate expense). False statements such as these are never tolerated, no matter how small the amount or the reason behind the action.

We all provide information that RBC uses to prepare financial statements, regulatory reports and publicly filed documents. This means we all play a role in ensuring that the information we record complies with all applicable accepted accounting principles and RBC internal controls.

Keep in mind that falsifying financial or business records (including client documentation) or making false statements to our auditors is against the law. Likewise, we must not make a payment or establish an account on RBC's behalf under false pretenses.

7. Conclusion

Our Code of Conduct is integral to the way we do business at RBC. As employees it is our duty to read and understand the Code. That said, there will be times when complex and sensitive issues arise that may cause confusion. Don't hesitate to speak up, ask questions and seek help.

"We are all responsible for protecting and enhancing RBC's reputation by following our Code of Conduct. It's also important that we support one another in doing what's right, including feeling empowered to challenge situations we believe are wrong."

David McKay, President and CEO, RBC

Exhibit 5

Return on Equity and Assets Ratios

	For the Year-Ended October 2022	For the Year-Ended October 2021	For the Year-Ended October 2020
Return on Assets	0.84%	0.96%	0.70%
Return on Equity	16.4%	18.6%	14.2%
Dividend Payout Ratio	45%	39%	55%

Exhibit 31.1

SOX 302 CERTIFICATION

I, David McKay, certify that:

1. I have reviewed this annual report on Form 40-F of Royal Bank of Canada;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the issuer as of, and for, the periods presented in this report;

4. The issuer's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the issuer and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the issuer, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the issuer's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the issuer's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the issuer's internal control over financial reporting; and

5. The issuer's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the issuer's auditors and the audit committee of the issuer's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the issuer's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the issuer's internal control over financial reporting.

November 30, 2022

/s/ David McKay
Name: David McKay
Title: President and Chief Executive Officer

Exhibit 31.2

SOX 302 CERTIFICATION

I, Nadine Ahn, certify that:

1. I have reviewed this annual report on Form 40-F of Royal Bank of Canada;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the issuer as of, and for, the periods presented in this report;

4. The issuer's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the issuer and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the issuer, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the issuer's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the issuer's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the issuer's internal control over financial reporting; and

5. The issuer's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the issuer's auditors and the audit committee of the issuer's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the issuer's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the issuer's internal control over financial reporting.

November 30, 2022

/s/ Nadine Ahn

Name: Nadine Ahn
Title: Chief Financial Officer

Exhibit 32.1

CERTIFICATIONS

Pursuant to section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), the undersigned officer of Royal Bank of Canada, a Canadian chartered Bank (the "Bank"), hereby certifies, to such officer's knowledge, that:

The annual report on Form 40-F for the year ended October 31, 2022 (the "Report") of the Bank fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Bank.

Dated: November 30, 2022

/s/ David McKay

Name: David McKay
Title: President and Chief Executive Officer

Exhibit 32.2

CERTIFICATIONS

Pursuant to section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), the undersigned officer of Royal Bank of Canada, a Canadian chartered Bank (the "Bank"), hereby certifies, to such officer's knowledge, that:

The annual report on Form 40-F for the year ended October 31, 2022 (the "Report") of the Bank fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Bank.

Dated: November 30, 2022

/s/ Nadine Ahn

Name: Nadine Ahn
Title: Chief Financial Officer