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, 2019 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
30 Hudson Street
Jersey City, New Jersey, 07302
Attention: Maria Douvas
Senior Vice President, U.S. General Counsel & Global Head of Litigation
(212) 858-7430
(Name, address (including zip code) and telephone number (including area code) of agent for service in the United States)

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New York, New York
USA 10004-2498
Tel: (212) 558-4000

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	1,430,678,036
First Preferred Shares	
Series W	12,000,000
Series AA	12,000,000
Series AC	8,000,000
Series AE	10,000,000
Series AF	8,000,000
Series AG	10,000,000
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 BJ	6,000,000
Series C-2	20,385
Series BK	29,000,000
Series BM	30,000,000
Series BO	14,000,000

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 ☐

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.

CONTROLS AND PROCEDURES

Information about disclosure controls and procedures and internal control over financial reporting can be found under "Controls and procedures" on page 102 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 112 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 four audit committee financial experts serving on its audit committee. Jacynthe Côté, David F. Denison, Frank Vettese and Jeffery W. 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 Jacynthe Côté, David F. Denison, Frank Vettese and Jeffery W. Yabuki as audit committee financial experts does not make any of them an "expert" for any purpose, impose any duties, obligations or liability on Jacynthe Côté, David F. Denison, Frank Vettese and Jeffery W. 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 2019, the Registrant adopted a revised Code of Conduct. Key amendments made to the Code of Conduct included enhancements and clarifications to provisions related to reporting misconduct, dealing with clients, communities and others, conflicts of interest, and protecting RBC property. 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 23 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 45 of our Management's Discussion and Analysis set forth in Exhibit 2, which section is incorporated by reference.

TABULAR DISCLOSURE OF CONTRACTUAL OBLIGATIONS

Tabular disclosure of contractual obligations can be found under "Transactional/positional risk drivers – Liquidity and funding risk" beginning on page 71 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 23 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 2019.

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 2019, these accounts generated less than $3,000 in gross revenue and less than $3,000 in net income.

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 I. McKay
Name: David I. McKay
Title: President and Chief Executive Officer

Date: December 4, 2019

INDEX TO EXHIBITS

Exhibit	Exhibit No.
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Exhibit 1

ROYAL BANK OF CANADA

ANNUAL INFORMATION FORM

December 3, 2019

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 and market review and outlook for Canadian, U.S., European and global economies, the regulatory environment in which we operate, the Strategic priorities and Outlook sections for each of our business segments, and the risk environment including our liquidity and funding risk as set out in the 2019 Management's Discussion and Analysis for the fiscal year ended October 31, 2019 (the 2019 Management's Discussion and Analysis). 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", "plan" and "project" and similar expressions of future or conditional verbs such as "will", "may", "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 and that our financial performance objectives, vision and strategic goals will not be achieved. 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, strategic, reputation, legal and regulatory environment, competitive and systemic risks and other risks discussed in the risk sections of our Annual Report for the fiscal year ended October 31, 2019 (the 2019 Annual Report) including information technology and cyber risk, privacy, data and third party related risks, geopolitical uncertainty, Canadian housing and household indebtedness, regulatory changes, digital disruption and innovation, climate change, the business and economic conditions in the geographic regions in which we operate, the effects of changes in government fiscal, monetary and other policies, tax risk and transparency, and environmental and social risk.

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 "Overview and outlook" section and for each business segment under the headings "Strategic priorities" and "Outlook" in our 2019 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 2019 Management's Discussion and Analysis.

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*Notes 19, 21 and 26 to the 2019 Annual Consolidated Financial Statements for the fiscal year ended October 31, 2019 (the 2019 Annual Consolidated Financial Statements) for Royal Bank of Canada are incorporated by reference herein.

INFORMATION IS AT OCTOBER 31, 2019, 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.

The Canadian economy showed growth in 2017, supported by robust gains in consumer spending amid strong employment growth, low interest rates and wealth accumulation from rising home prices. The U.S. economy also maintained moderate growth and the Eurozone experienced positive growth despite a politically uncertain environment.

In 2017, RBC delivered solid operating results across most business segments driven by strong earnings in Personal & Commercial Banking, Capital Markets, Wealth Management and Investor & Treasury Services partially offset by lower earnings in Insurance. In accordance with transition planning, Group Executive changes in 2017 included Rod Bolger assuming the role of Chief Financial Officer and Jennifer Tory assuming the role of Chief Administrative Officer following the retirement of Janice Fukakusa, and the appointments of Neil McLaughlin to Group Head, Personal & Commercial Banking, Helena Gottschling to Chief Human Resources Officer and Michael Dobbins to Head, Strategy and Corporate Development.

In 2018, the Canadian economy continued to show growth, albeit at a slower pace than 2017, and economic growth shifted away from consumers as higher interest rates and a slower housing market impacted spending habits. The U.S. economy also continued to show growth, supported by consumer spending and business investment. Although supported by domestic demand, growth in the Eurozone slowed in 2018 as weaker exports to emerging markets impacted trade. Global equity markets experienced elevated volatility in 2018 and equity markets fell due to rising interest rates, inflationary concerns, declines in commodity prices and global trade tensions.

[1] 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.

RBC delivered record results in 2018 reflecting strong earnings in Personal & Commercial Banking and Wealth Management driven by benefits from higher Canadian and U.S. interest rates and solid volume growth, and in Capital Markets, driven by a lower effective tax rate and higher revenue in Corporate and Investment Banking and Global Markets. Higher results in Insurance also contributed to the increase, while Investor & Treasury Services earnings remained consistent with those in 2017. In 2018, Graeme Hepworth was appointed Chief Risk Officer and joined the Group Executive.

In 2019, the Canadian economy continued to show growth, albeit at a slower pace than 2018. The uncertain global economic backdrop, rising trade tensions and challenges in the energy sector weighed on business sentiment. The U.S. economy also showed slower growth impacted by these factors. However, continued growth is supported by strong consumer spending. The Eurozone economy growth slowed as growth in Germany has slowed amid a sustained downturn in the industrial sector while growth in other major euro area economies remains modest. Government bond yields remain historically low and yield curves in Canada and the U.S. inverted in mid-2019 and remain flat. Global equity markets experienced volatility in 2019 as concerns about rising interest rates, geopolitical tensions and slowing global growth put downward pressure at the beginning of the year while subsequent monetary policy stimulus supported the recovery of equity markets. In 2019, Derek Neldner was appointed to the role of Group Head, Capital Markets and Doug Guzman assumed leadership of Investor & Treasury Services.

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 to the extent practicable. 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, global trade agreements, legislative developments on data privacy, amendments to anti-money laundering regulations, and U.S., U.K. and European regulatory reforms.

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

Business Segment	**Acquisition/Disposition**	**Key Characteristics**
Personal & Commercial Banking	U.S. operations of payment processing joint venture, Moneris Solutions Corporation (2017)	• Disposition by our payment processing joint venture Moneris Solutions Corporation of its U.S. operations.
Insurance	RBC General Insurance Company (2016)	• Disposition of our home and auto insurance manufacturing business, which included a 15 year strategic distribution agreement allowing RBC Insurance to market and sell a full suite of property and casualty insurance products to Canadians.

Additional information can also be found in the “Overview and outlook” section beginning on page 13 of our 2019 Management’s Discussion and Analysis, which section is 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 85,000+ employees who 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 34 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 13 and under "Business segment results" beginning on page 21 of our 2019 Management's Discussion and Analysis, which sections are incorporated by reference herein.

Seasonality

Information about seasonality is provided under "Quarterly results and trend analysis" beginning on page 43 of our 2019 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 and auto financing companies, in Canada; other banks, trust companies and investment management companies, as well as public institutions, in the Caribbean; and other Canadian banking institutions with 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 (including City National) business operates in a fragmented and highly competitive industry and competition includes 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 part of international banks as well as national and regional asset managers in the geographies where we serve clients. Competitors to our International Wealth Management business comprise global wealth managers, traditional offshore private banks and domestic wealth managers. In our Canadian Insurance business, the majority of our competitors specialize in life and health or property and casualty products. In our International Insurance business we compete in the global reinsurance market which is competitive and is dominated by a few large players, with significant presence in the U.S., the U.K. and Europe. Our Investor & Treasury Services business competes with other global asset services providers. Our Capital Markets business competes mainly with other Canadian banks in Canada, and with large U.S. and global investment banks and smaller regional firms in the U.S. In the U.K. and Europe, our Capital Markets business competes in our key sectors of expertise with global and regional investment banks; and in Australia and Asia, we compete with global and regional investments banks in select products. Key competitive factors include the range and features of financial products and services offered, pricing, distribution and service quality.

Additional information about our competition can be found under "Business segment results" beginning on page 21 of our 2019 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) 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 Bank as well as its FRFI Subsidiaries. OSFI is required, at least once a year, to examine the affairs and business of each institution for the purpose of determining whether statutory requirements are duly observed and the institution is in sound financial condition, and report to the Minister. The Bank and the FRFI Subsidiaries are also required to make periodic filings and reports to OSFI.

The Bank and the FRFI Subsidiaries 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 Bank and the FRFI Subsidiaries are also subject to provincial and territorial laws of general application.

The Bank and its subsidiaries, Royal Trust Corporation of Canada, The Royal Trust Company, Royal Bank Mortgage Corporation and RBC Investor Services Trust are member institutions of the Canada Deposit Insurance Corporation (CDIC). 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 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).

The Bank and the FRFI Subsidiaries are 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.

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

In April 2018, the Government of Canada published the final regulations on Canada's bank recapitalisation regime (the Bail-in Regime), which became effective on September 23, 2018 for domestic systemically important banks, including the Bank. Pursuant to the Bail-in Regime and 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/investorrelations/_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, in some cases, by the rules of the applicable self-regulatory organization (the Investment Industry Regulatory Organization of Canada for investment dealers and the Mutual Fund Dealers Association of Canada (MFDA) for mutual fund dealers). 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 Fund, 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.

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 life and living benefits insurance along with money products such as annuities and segregated funds, on both an individual and group basis, 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 requires both a "satisfactory" composite regulatory rating and a "satisfactory" rating on the "management" component of their last regulatory examination.

Under the *International Banking Act* of 1978 (IBA) and the *Bank Holding Company Act* of 1956 (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*, 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*.

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. laws. 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 Debt Previously Contracted branch subsidiaries). 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 recently finalized rules which tailored enhanced prudential standards for FBOs and large U.S. banking organizations. In addition, under the *Dodd-Frank Act*, the Bank is registered as a "Swap Dealer" with the U.S. Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA).

The *USA PATRIOT Act*, which amended the *Bank Secrecy Act*, requires U.S. banks and FBOs with U.S. operations to maintain appropriate policies, procedures and controls relating to anti-money laundering compliance, suspicious activity and currency transaction reporting and due diligence on customers to prevent, detect and report individuals and entities involved in money laundering and the financing of terrorism.

The Bank maintains two branches in New York which 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 can only take deposits from non-U.S. sources.

The OCC examines and supervises the Bank's U.S. branch office activities and annually examines and assesses their 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. The activities conducted at the Bank's 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 Bank's 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 permissible. 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 (CFPB), an independent agency created under the *Dodd-Frank Act.* As a national bank in the U.S., CNB also has fiduciary powers and offers trust services and investment management services under those powers.

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 subsidiary of BHC, 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 in the following U.S.-registered broker-dealer subsidiaries:

- RBC Capital Markets, LLC (RBC CM LLC),
- RBC Capital Markets Arbitrage S.A. (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 (FINRA) 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 (MSRB).

Investment Management and Other Fiduciary Activities

The Bank's New York branches have fiduciary powers, and certain 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* (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 to that for broker-dealers, the standard of conduct is higher due to the advisers' status as fiduciaries. This status as a fiduciary limits the investment adviser's ability to make use of affiliates and requires that it avoid or manage and disclose conflicts of interests with respect to the conduct of its business.

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

- RBC CM LLC,
- RBC CM Fund Partners, LLC,
- RBC Global Asset Management (U.S.) Inc. (GAM),
- RBC Global Asset Management (UK) Limited,
- RBC Private Counsel (USA) Inc.,
- BlueBay Asset Management LLP,
- BlueBay Asset Management USA LLC,
- City National Rochdale, LLC (CNR),
- City National Securities, Inc.,
- Convergent Wealth Advisors, LLC,
- LMCG Investments, LLC,
- Mid-Continent Capital, L.L.C. and
- Symphonic Financial Advisors LLC.

GAM and CNR also each sponsor and act as the adviser to several U.S. mutual funds. The U.S. *Investment Company Act of 1940* 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.

ERISA and the Internal Revenue Code

The U.S. *Employee Retirement Income Security Act of 1974*, as amended (ERISA), and the related rules regulate the activities of the financial services industry with respect to pension plan clients. Similarly, the U.S. *Internal Revenue Code* and the regulations 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 47 to 89 of our 2019 Management's Discussion and Analysis, which discussions are incorporated by reference herein.

Environmental and Social Risk Policies

RBC has a long history of environmental leadership dating back to 1991 when we launched our first corporate environmental policy. RBC is committed to transparent disclosure and we report annually on our key environmental performance metrics and targets in our Environmental, Social, and Governance (ESG) Performance Report and Carbon Disclosure Project submissions (responder since 2003 and a signatory since 2007). We have been a signatory to the Equator Principles since 2003, and RBC Global Asset Management and BlueBay Asset Management LLP have been signatories to the United Nations Principles of Responsible Investment since 2015. RBC Europe Limited, a wholly-owned subsidiary of the Bank, is a signatory to the Green Bond Principles and it reports annually on its green bond underwriting activities. In November 2017, we published the RBC Climate Change Position and Disclosure Statement, which established our initial position and approach on climate-related risks, opportunities and disclosures. RBC is committed to publishing climate-related disclosures, at least annually, that consider the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures, and has provided these since 2017. RBC also publishes an annual Modern Slavery Act Statement, which sets out the steps that we have taken to ensure that slavery and human trafficking are not taking place in our supply chains or our business.

RBC has a suite of environmental and social risk management policies, which include policies that are enterprise-wide, policies that are business-specific, and/or policies that apply to certain issues, products, services or industry sectors. These policies focus on environmental and social risk issues including, but not limited to: site contamination, waste management, land and resource use, biodiversity, water quality and availability, climate change, environmental regulation, human rights, Indigenous Peoples' rights and community engagement. Our environmental and social risk policies seek to identify sectors, clients and business activities that may be exposed to environmental and/or social risk; apply enhanced due diligence and escalation procedures; and establish requirements to manage, mitigate and monitor environmental and social risks. Business segments and corporate functions are responsible for incorporating environmental and social risk management requirements within their operations.

Additional information about our environmental and social risk policies can be found under "Overview of other risks – Environmental and social risk" beginning on page 88 of our 2019 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. Currently, Non-Cumulative First Preferred Shares Series W, AA, AC, AE, AF, AG, AZ, BB, BD, BF, BH, BI, BJ, BK, BM, BO and C-2 are outstanding. On November 24, 2018, we redeemed all of our issued and outstanding Non-Cumulative First Preferred Shares Series AD. On February 24, 2019, we redeemed all of our issued and outstanding Non-Cumulative First Preferred Shares Series AK, AJ and AL.

The Non-Cumulative First Preferred Shares Series W are, subject to the consent of the Superintendent, the requirements of the *Bank Act* and the approval of the Toronto Stock Exchange, redeemable or exchangeable by the Bank into common shares. 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.

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 will be considered non-qualifying capital instruments and will 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, BJ, BK, BM and BO contain non-viability contingent capital provisions necessary for the shares 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.

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 Non-Cumulative First Preferred Shares Series C-2 (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 right 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 66$^{2}/_{3}$ 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 the "Capital management" section beginning on page 90 of our 2019 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, 2018, see the "Capital management" section beginning on page 90 of our 2019 Management's Discussion and Analysis and "Subordinated debentures" in Note 19 beginning on page 190 of our 2019 Annual Consolidated Financial Statements, which section and note are incorporated by reference herein.

Constraints

The *Bank Act* contains restrictions (which are subject to any orders that may be issued by the Governor in Council) on the issue, transfer, acquisition, beneficial ownership and voting of all shares of a chartered bank. The following is a summary of such 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 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 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.

In addition, the *Bank Act* 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 governmental 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. 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. There can be no assurance that our credit ratings and rating outlooks will not be lowered or that ratings 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 December 3, 2019, RBC had the following solicited ratings from the rating agencies listed below:[3]

		RATING	RANK*
Moody's Investors Service	Legacy Senior Long-term Debt[1]	Aa2	3 of 21
	Senior Long-term Debt[2]	A2	6 of 21
	Short-term Debt	P-1	1 of 4
	Subordinated Debt	Baa1	8 of 21
	NVCC Subordinated Debt	Baa1 (hyb)	8 of 21
	Preferred Shares	Baa3	10 of 21
	NVCC Preferred Shares	Baa3 (hyb)	10 of 21
	Outlook – Stable		
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 8
	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	3 of 23
	Short-term Debt	F1+	1 of 8
	Subordinated Debt	AA-	4 of 23
	NVCC Subordinated Debt	AA-	4 of 23
	Preferred Shares	-	-
	NVCC Preferred Shares	-	-
	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		

* 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.

A definition of the categories of each rating as at December 3, 2019 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.

3 On July 24, 2019, Kroll Bond Rating Agency, which is registered with the SEC as a nationally recognized statistical rating organization, affirmed the senior unsecured long-term debt and deposit ratings of AA (ranking 3 of 22), the short-term rating of K1+ (ranking 1 of 7) and Stable outlook for RBC. These ratings were unsolicited and RBC did not participate in the ratings process.

On October 22, 2018, Fitch Ratings affirmed our ratings with a stable outlook.

On June 18, 2019, DBRS revised our outlook to stable from positive, upgraded our legacy senior long-term debt rating to AA (high) from AA and upgraded our senior long-term debt rating to AA from AA (low).

On June 24, 2019, Standard & Poor's affirmed our ratings with a stable outlook.

On August 1, 2019, Moody's affirmed our ratings with a stable outlook.

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 chart 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 77 of our 2019 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 preferred shares, except the Series C-2 Preferred Shares, 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 NYSEConnect.

	Common Shares (TSX)			Common Shares (NYSE)		
Month	**High ($)**	**Low ($)**	**Volume**	**High (US$)**	**Low (US$)**	**Volume**
November 2018	98.74	93.21	52,423,901	74.38	69.99	15,241,225
December 2018	98.35	90.10	70,755,599	74.68	65.76	15,241,867
January 2019	100.27	92.26	68,001,358	76.37	67.75	19,980,594
February 2019	103.30	100.02	55,366,425	78.51	75.20	15,482,626
March 2019	104.30	100.82	63,649,347	78.66	75.47	23,365,437
April 2019	107.91	101.07	65,029,703	80.39	75.76	16,113,800
May 2019	107.18	101.43	56,678,310	79.82	74.89	18,283,569
June 2019	105.95	101.27	42,329,327	80.10	75.02	14,780,514
July 2019	106.03	103.46	45,079,998	81.00	78.33	19,468,466
August 2019	104.43	97.30	47,601,510	78.94	73.20	20,713,813
September 2019	108.16	98.45	66,976,877	81.61	73.76	19,793,602
October 2019	108.25	104.05	68,050,116	82.58	77.98	26,333,452
November 2019	109.68	106.22	40,490,600	82.55	80.70	14,523,954

The following tables provide the price range and trading volumes of the First Preferred Shares on the TSX for the periods indicated.[4] Prices are based on the reported amounts from the TSX HDA.

	Series W			Series AA		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	24.09	23.47	326,021	25.29	24.95	94,468
December 2018	24.28	23.64	651,555	25.10	24.53	127,801
January 2019	24.39	23.75	484,732	25.30	24.95	137,130
February 2019	24.50	24.07	120,791	25.27	25.00	152,811
March 2019	25.25	24.41	128,636	25.72	25.20	71,100
April 2019	25.29	24.80	270,760	25.54	25.10	128,433
May 2019	25.10	24.66	211,313	25.27	25.12	135,859
June 2019	24.94	24.55	40,751	25.44	25.15	153,624
July 2019	25.18	24.80	72,211	25.40	25.10	220,640
August 2019	25.00	24.60	100,548	25.35	25.20	125,364
September 2019	25.26	24.88	81,281	25.46	25.24	98,924
October 2019	25.27	24.82	49,842	25.49	25.16	108,287
November 2019	25.10	24.67	103,836	25.46	25.26	95,375

[4] On November 24, 2018, we redeemed all of our issued and outstanding Non-Cumulative First Preferred Shares Series AD. On February 24, 2019, we redeemed all of our issued and outstanding Non-Cumulative First Preferred Shares Series AK, AJ and AL.

	Series AC			Series AD			Series AE		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	25.27	24.92	182,282	25.02	24.96	110,252	25.29	25.00	132,025
December 2018	25.10	24.59	174,674	-	-	-	25.18	24.67	108,435
January 2019	25.28	25.00	299,091	-	-	-	25.28	24.99	89,504
February 2019	25.23	25.05	118,256	-	-	-	25.35	25.05	61,371
March 2019	25.35	25.16	61,894	-	-	-	26.37	25.26	56,165
April 2019	25.37	25.11	51,519	-	-	-	25.42	25.10	63,642
May 2019	25.30	25.11	103,374	-	-	-	25.25	25.11	55,342
June 2019	25.29	25.14	76,208	-	-	-	25.32	25.12	32,463
July 2019	25.35	25.15	64,266	-	-	-	25.44	25.15	77,294
August 2019	25.40	25.17	92,054	-	-	-	25.33	25.20	54,910
September 2019	25.47	25.21	50,618	-	-	-	25.36	25.25	29,057
October 2019	25.44	25.17	115,843	-	-	-	25.39	25.16	55,866
November 2019	25.35	25.21	62,676	-	-	-	25.39	25.21	33,983

	Series AF			Series AG			Series AJ		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	25.30	24.93	129,071	25.30	25.02	123,812	25.06	24.98	395,172
December 2018	25.18	24.84	88,088	25.21	24.79	89,209	25.12	24.75	160,572
January 2019	25.34	24.80	91,760	25.28	25.00	86,586	25.19	24.93	186,662
February 2019	25.25	25.05	46,760	25.28	25.07	52,948	25.00	24.95	58,795
March 2019	25.37	25.20	84,102	25.46	25.25	65,700	-	-	-
April 2019	25.39	25.08	277,316	25.46	25.10	101,505	-	-	-
May 2019	25.22	25.09	118,023	25.32	25.15	86,306	-	-	-
June 2019	25.44	25.10	100,358	25.33	25.16	22,206	-	-	-
July 2019	25.50	25.19	258,849	25.38	25.18	60,688	-	-	-
August 2019	25.35	25.19	78,838	25.37	25.20	62,160	-	-	-
September 2019	25.45	25.26	39,885	25.40	25.28	48,653	-	-	-
October 2019	25.40	25.22	66,965	25.38	25.20	70,756	-	-	-
November 2019	25.36	25.25	37,286	25.58	25.22	66,410	-	-	-

	Series AK			Series AL			Series AZ		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	25.02	25.00	88,644	25.10	25.02	395,339	23.07	20.22	399,686
December 2018	25.13	24.99	48,854	25.15	24.99	195,573	21.22	18.07	596,976
January 2019	25.16	24.93	409,864	25.24	24.92	1,207,470	21.28	19.00	443,713
February 2019	24.99	24.97	2,600	25.17	24.95	203,751	19.79	18.95	562,356
March 2019	-	-	-	-	-	-	19.56	18.38	426,273
April 2019	-	-	-	-	-	-	19.08	18.20	275,144
May 2019	-	-	-	-	-	-	18.90	17.60	463,675
June 2019	-	-	-	-	-	-	18.02	17.20	476,151
July 2019	-	-	-	-	-	-	18.50	17.65	409,578
August 2019	-	-	-	-	-	-	18.15	16.37	766,042
September 2019	-	-	-	-	-	-	17.99	16.78	338,795
October 2019	-	-	-	-	-	-	17.45	16.73	215,275
November 2019	-	-	-	-	-	-	17.33	16.80	417,095

	Series BB			Series BD			Series BF		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	23.06	20.27	411,984	24.27	21.66	282,281	23.77	21.00	334,815
December 2018	21.26	17.85	371,172	22.34	19.83	368,028	21.94	19.67	376,311
January 2019	21.20	18.82	464,201	22.60	20.50	370,601	22.41	20.45	140,336
February 2019	20.15	19.15	563,544	22.08	20.65	492,707	21.28	20.16	437,761
March 2019	19.99	18.65	985,912	21.95	19.90	209,879	21.33	19.49	211,339
April 2019	19.51	18.77	436,360	21.25	20.39	376,036	20.76	20.00	422,303
May 2019	18.83	17.65	252,897	20.87	18.91	290,004	20.55	18.68	241,025
June 2019	17.93	17.11	313,118	19.97	18.50	373,449	19.40	18.15	121,540
July 2019	18.72	17.81	663,570	20.69	19.81	189,342	20.00	19.00	83,989
August 2019	18.20	16.27	364,191	20.00	17.50	472,417	19.38	16.89	218,932
September 2019	17.93	16.85	347,921	19.41	17.99	210,839	18.87	17.40	284,244
October 2019	17.72	16.75	435,830	19.46	18.13	212,705	18.76	17.78	323,711
November 2019	17.48	16.88	517,057	19.20	18.17	471,164	18.86	17.73	126,770

	Series BH			Series BI			Series BJ		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	24.18	23.33	37,268	24.37	23.31	73,542	25.23	24.33	87,865
December 2018	24.24	22.69	103,566	24.25	22.80	65,981	25.39	24.45	104,239
January 2019	24.20	23.22	71,310	24.37	23.29	53,169	25.33	24.72	118,183
February 2019	23.93	23.60	88,224	24.49	23.64	68,255	25.23	24.92	186,224
March 2019	24.40	23.71	42,919	24.47	23.65	178,030	25.49	25.10	42,862
April 2019	24.66	24.06	49,153	24.55	24.06	86,436	25.47	25.01	182,424
May 2019	24.12	23.79	127,549	24.15	23.89	24,401	25.40	25.06	49,039
June 2019	24.23	23.67	38,216	24.15	23.70	44,582	25.35	25.10	47,480
July 2019	24.21	23.85	77,267	24.25	23.72	78,591	25.64	25.25	50,390
August 2019	24.14	23.75	107,415	24.26	23.82	146,751	25.50	24.99	80,583
September 2019	24.47	23.93	39,513	24.44	24.04	104,523	25.75	25.40	53,804
October 2019	24.86	24.31	50,771	24.82	24.30	159,268	25.79	25.47	108,397
November 2019	24.75	24.48	40,743	24.67	24.44	51,028	25.70	25.52	78,017

	Series BK			Series BM			Series BO		
Month	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**	**High ($)**	**Low ($)**	**Volume**
November 2018	25.99	25.51	1,623,961	26.08	25.63	424,693	24.90	22.57	1,584,680
December 2018	26.23	25.31	311,396	26.18	25.55	200,378	23.40	20.55	926,337
January 2019	26.25	25.50	494,035	26.30	25.69	252,003	23.50	20.70	633,633
February 2019	26.11	25.70	314,654	26.20	25.81	146,616	23.20	21.50	339,469
March 2019	26.35	25.90	484,587	26.47	25.96	492,429	23.00	21.85	320,438
April 2019	26.49	25.89	215,745	26.58	25.90	195,847	22.50	21.66	406,277
May 2019	26.05	25.78	193,149	26.19	25.93	130,704	21.88	20.78	324,689
June 2019	26.08	25.69	209,601	26.19	25.90	100,103	21.37	20.55	236,349
July 2019	26.22	25.79	145,510	26.31	25.92	278,707	21.79	20.81	198,247
August 2019	25.85	25.28	505,144	26.08	25.46	140,144	21.19	18.78	353,990
September 2019	26.05	25.44	265,260	26.14	25.60	133,341	20.65	19.12	266,970
October 2019	26.05	25.53	331,327	26.11	25.64	229,526	20.25	18.80	331,023
November 2019	25.78	25.53	298,276	25.98	25.74	175,258	19.35	18.70	568,995

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 NYSEConnect.

	Series C-2		
Month	**High (US$)**	**Low (US$)**	**Volume**
November 2018	32.60	29.22	17,154
December 2018	32.60	29.00	10,904
January 2019	30.70	29.05	7,266
February 2019	32.99	29.63	12,589
March 2019	33.00	29.51	18,776
April 2019	31.51	29.95	6,837
May 2019	32.99	30.00	12,705
June 2019	32.50	30.01	11,044
July 2019	31.32	30.66	16,103
August 2019	31.40	28.31	21,917
September 2019	30.04	27.96	27,610
October 2019	30.20	29.00	14,532
November 2019	29.20	28.37	13,369

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 share data" in the "Capital management" section on page 96 of our 2019 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 21 on page 193 of our 2019 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 share data" in the "Capital management" section on page 96 of our 2019 Management's Discussion and Analysis, which section is incorporated by reference herein.

DIRECTORS AND EXECUTIVE OFFICERS

Directors

The following are the Bank's directors as at December 3, 2019:

Name and Year Elected	**Province/State and Country of Residence**	**Occupation**
Andrew A. Chisholm (2016)	Ontario, CAN	Corporate Director
Jacynthe Côté (2014)	Quebec, CAN	Corporate Director

Name and Year Elected	Province/State and Country of Residence	Occupation
Toos N. Daruvala (2015)	New York, U.S.A.	Co-Chief Executive Officer, McKinsey Investment Office
David F. Denison (2012)	Ontario, CAN	Corporate Director
Alice D. Laberge (2005)	British Columbia, CAN	Corporate Director
Michael H. McCain (2005)	Ontario, CAN	President and Chief Executive Officer, Maple Leaf Foods Inc.
David I. McKay (2014)	Ontario, CAN	President and Chief Executive Officer, Royal Bank of Canada
Heather Munroe-Blum (2011)	Quebec, CAN	Chairperson, Canada Pension Plan Investment Board
Kathleen P. Taylor (2001)	Ontario, CAN	Chair of the Board, Royal Bank of Canada
Bridget A. van Kralingen (2011)	New York, U.S.A.	Senior Vice-President, Industry Platforms and Global Industries, IBM Corporation
Thierry Vandal (2015)	New York, U.S.A.	President, Axium Infrastructure US Inc.
Frank Vettese (2019)	Ontario, CAN	Corporate Director
Jeffery W. Yabuki (2017)	Wisconsin, U.S.A.	Chairman and Chief Executive Officer, Fiserv, Inc.

Directors are elected annually and hold office until the next annual meeting of shareholders. Since November 1, 2014, the directors have held the principal occupations described above, except for the following:

Mr. Andrew A. Chisholm was an Advisory Director at Goldman Sachs & Co. prior to his retirement in April 2016 and Senior Strategy Officer at Goldman Sachs & Co. prior to 2014.

Mr. Toos N. Daruvala was director and senior partner prior to December 2015 and Director Emeritus and Senior Advisor prior to January 2017 at McKinsey & Company.

Mr. David I. McKay was President of Royal Bank of Canada prior to August 2014 and Group Head, Personal & Commercial Banking of Royal Bank of Canada prior to March 2014.

Ms. Bridget A. van Kralingen was Senior Vice-President, IBM Global Business Services, IBM from January 2012 to August 2016.

Mr. Thierry Vandal was President and Chief Executive Officer of Hydro-Québec prior to May 2015.

Mr. Frank Vettese was Managing Partner and Chief Executive, Deloitte Canada from 2012 to June 2019.

Committees of the Board

Audit Committee: D.F. Denison (Chair), A.A. Chisholm, J. Côté, M.H. McCain, F. Vettese and J.W. Yabuki.

Risk Committee: T.N. Daruvala (Chair), D.F. Denison, A.D. Laberge, H. Munroe-Blum, B.A. van Kralingen and T. Vandal.

Governance Committee: J. Côté (Chair), A.A. Chisholm, T.N. Daruvala, A.D. Laberge and J.W. Yabuki.

Human Resources Committee: T. Vandal (Chair), M.H. McCain, H. Munroe-Blum, B.A. van Kralingen and F. Vettese.

Executive Officers

The following are the Bank's executive officers as at December 3, 2019:

Name	Province and Country of Residence	Title
Rod Bolger	Ontario, CAN	Chief Financial Officer
Michael Dobbins	Ontario, CAN	Chief Strategy & Corporate Development Officer
Helena Gottschling	Ontario, CAN	Chief Human Resources Officer
Douglas Guzman	Ontario, CAN	Group Head, Wealth Management, Insurance and Investor & Treasury Services
Graeme Hepworth	Ontario, CAN	Chief Risk Officer
Christoph Knoess	New York, U.S.A.	Chief Administrative Officer
David I. McKay	Ontario, CAN	President & Chief Executive Officer
Neil McLaughlin	Ontario, CAN	Group Head, Personal & Commercial Banking
Derek Neldner	Ontario, CAN	Group Head and CEO, Capital Markets
Bruce Ross	Ontario, CAN	Group Head, Technology and Operations
Jennifer Tory	Ontario, CAN	Chief Administrative Officer

Since November 1, 2014, the executive officers have held the positions described below:

Mr. Rod Bolger was appointed to Group Executive in his role as Chief Financial Officer effective December 1, 2016. Prior to his current role, Mr. Bolger was Executive Vice President, Finance & Controller since 2015 and Senior Vice President, Finance & Controller since 2011.

Mr. Michael Dobbins was appointed to Group Executive in his role as Chief Strategy & Corporate Development Officer effective November 1, 2016. Prior to his current role, Mr. Dobbins was Executive Vice President, Personal Financing Products Canada & U.S. since 2012.

Ms. Helena Gottschling was appointed to Group Executive in her role as Chief Human Resources Officer effective June 1, 2017. Prior to her current role, Ms. Gottschling was Senior Vice President, Human Resources since January 2008.

Mr. Douglas Guzman was appointed to Group Executive in his role as Group Head, Wealth Management & Insurance effective November 1, 2015 and assumed leadership of Investor & Treasury Services effective November 1, 2019.[5] 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 and before that he was Chief Risk Officer, Europe & Asia since 2011.

Mr. Christoph Knoess was appointed to the Group Executive in his role as Chief Administrative Officer effective December 2, 2019. Prior to his appointment, Mr. Knoess was a Partner in Digital, Technology and Organizational Agility in Banking at McKinsey & Company since 2017 and before 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. 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.[5] Prior to his current role, Mr. Neldner was Global Head of Investment Banking since June 2018, Head, Canadian and Asia Pacific Banking since June 2014 and before that he was Head of Energy, Canada since February 2006.

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.

Ms. Jennifer Tory was appointed Chief Administrative Officer effective May 2017. Ms. Tory was appointed to Group Executive in her prior role as Group Head, Personal & Commercial Banking effective April 2014. Prior to joining Group Executive, Ms. Tory was Regional President, Greater Toronto Region since November 2005.[6]

Ownership of Securities

To our knowledge, as at October 31, 2019, 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.

[5] On August 21, 2019, Mr. McGregor announced his decision to retire from the Bank effective January 31, 2020. On November 1, 2019, Mr. McGregor was appointed Chairman, Capital Markets and transferred his executive leadership of Capital Markets and Investor & Treasury Services to Mr. Neldner and Mr. Guzman, respectively.
[6] On October 25, 2019, Ms. Tory announced her decision to retire from the Bank effective December 31, 2019.

Cease Trade Orders, Bankruptcies, Penalties or Sanctions

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

(a) is, as at December 3, 2019 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,[7] 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,[7] for a period of more than 30 consecutive days, or

(b) is, as at December 3, 2019 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 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 December 3, 2019, 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[7] or by a Canadian securities regulatory authority[7] or has entered into a settlement agreement with a Canadian securities regulatory authority,[7] 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 26 “Legal and regulatory matters” beginning on page 201 of our 2019 Annual Consolidated Financial Statements, which note is incorporated by reference herein.

[7] 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.

Since October 31, 2018, (a) there have been no penalties or sanctions imposed against us by a court relating to Canadian securities legislation[8] or by a Canadian securities regulatory authority[8] 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[8] or with a Canadian securities regulatory authority[8] except that Royal Bank of Canada entered into a settlement agreement with the Ontario Securities Commission (OSC) in relation to identified insufficient supervision and controls for the foreign exchange business, largely in the period 2011 to 2013. The settlement included a voluntary payment of $13.55 million, plus costs in the amount of $800,000. RBC has since enhanced, and continues to enhance, its supervision and controls over its foreign exchange business. The settlement does not involve any allegations or admissions of violations of the *Securities Act*, and expressly acknowledges that OSC Staff did not find any evidence that RBC was involved in a plan to manipulate any benchmark. The settlement agreement was approved by the OSC by order dated August 30, 2019. This settlement was not material to RBC.

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.

TRANSFER AGENT AND REGISTRAR

For Canada and the Caribbean, 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 College Station, Texas. In the U.K., Computershare Investor Services PLC is the co-transfer agent located in Bristol, England.

EXPERTS

PricewaterhouseCoopers LLP (PwC), Chartered Professional Accountants, audited our Annual Consolidated Financial Statements, which comprise the consolidated balance sheets as of October 31, 2019 and October 31, 2018 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 in respect of the effectiveness of our internal control over financial reporting as of October 31, 2019. 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.

[8] 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.

Composition of Audit Committee

The Audit Committee consists of David F. Denison (Chair), Andrew A. Chisholm, Jacynthe Côté, Michael H. McCain, Frank Vettese and Jeffery W. 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 David F. Denison, Jacynthe Côté, Frank Vettese and Jeffery W. 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:

Andrew A. Chisholm, B.Comm., M.B.A., earned his Bachelor of Commerce from Queen's University and his M.B.A. from the University of Western Ontario. Mr. Chisholm served in various leadership capacities with Goldman Sachs & Co. during his 31 years with the firm. He also served as an Advisory Director of the firm from 2014 until his retirement in April 2016. Mr. Chisholm has been a member of our Audit Committee since July 2016.

Jacynthe Côté, B.Sc., earned her Bachelor of Science degree from Laval University. Ms. Côté was President and Chief Executive Officer of Rio Tinto Alcan from 2009 to 2014 and was President and Chief Executive Officer of Rio Tinto Alcan's Primary Metal business group, following Rio Tinto's acquisition of Alcan Inc. in October 2007. Ms. Côté has been a member of our Audit Committee since October 2014.

David F. Denison, O.C., B.Sc., B.Ed., FCPA, FCA, earned his bachelor degrees in mathematics and education from the University of Toronto and is a Chartered Professional Accountant, Chartered Accountant and a Fellow of CPA Ontario. Mr. Denison was President and Chief Executive Officer of the Canada Pension Plan Investment Board from 2005 to 2012 and was a director of Allison Transmission Holdings, Inc. from 2013 to 2017 and a director and Chair of the Board of Hydro One Limited from 2015 to 2018. He serves as a director of BCE Inc. Mr. Denison has been a member of our Audit Committee since August 2012.

Michael H. McCain, B.B.A., earned his Bachelor of Business Administration (Honours) degree from University of Western Ontario. Mr. McCain is President and Chief Executive Officer of Maple Leaf Foods Inc. (a food processing company) and President and a director of McCain Capital Inc. Mr. McCain serves as a director of Maple Leaf Foods Inc. Mr. McCain has been a member of our Audit Committee since April 2017.

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.

Jeffery W. 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 President and Chief Executive Officer of Fiserv, Inc. and from 1999 to 2005 held various senior positions at H&R Block, Inc., including the position of Executive Vice President and Chief Operating Officer. Mr. Yabuki serves as a director of Fiserv, Inc.

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 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 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, 2019 and October 31, 2018 to PwC and its affiliates, including the nature of each category of fees, are detailed below.

	Year ended October 31, 2019 ($Millions)			**Year ended October 31, 2018**[1] ($Millions)		
	Bank and Subsidiaries	**Mutual Funds**[2]	**Total**	**Bank and Subsidiaries**	**Mutual Funds**[2]	**Total**
Audit fees	38.5	2.5	**41.0**	35.8	2.3	**38.1**
Audit-related fees	8.0	-	**8.0**	7.0	-	**7.0**
Tax fees	0.1	0.3	**0.4**	0.1	0.3	**0.4**
All other fees	0.4	0.5	**0.9**	0.4	0.5	**0.9**
Total fees	47.0	3.3	**50.3**	43.3	3.1	**46.4**

[1] The 2018 amounts have been updated to reflect $0.5 million of additional audit fees which relate to the year ended October 31, 2018.
[2] 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 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 including services provided in connection with statutory and regulatory filings 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;
- 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; and
- the audits of various trusts and limited partnerships.

Tax Fees

Tax fees were paid for tax compliance services including the review of original and amended tax returns and assistance in completing routine tax schedules and calculations.

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 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 2019 Annual Report.

Copies of this Annual Information Form, our 2019 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, 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, 2019, 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 LION & GLOBE Symbol, ROYAL BANK OF CANADA and RBC, 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, 2019
Principal subsidiaries (1)	**Principal office address (2)**	**Carrying value of voting shares owned by the Bank (3)**
Royal Bank Holding Inc.	Toronto, Ontario, Canada	65,288
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.	St. Michael, Barbados	
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 US Group Holdings LLC (2)	Toronto, Ontario, Canada	22,329
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	10,068
RBC Dominion Securities Inc.	Toronto, Ontario, Canada	
RBC Finance S.à r.l./B.V. (2)	Amsterdam, Netherlands	2,907
RBC Holdings (Luxembourg) S.A R.L.	Luxembourg, Luxembourg	
RBC Holdings (Channel Islands) Limited	Jersey, Channel Islands	
Royal Bank of Canada (Channel Islands) Limited	Guernsey, Channel Islands	
RBC Europe Limited	London, England	2,570
Royal Bank Mortgage Corporation	Toronto, Ontario, Canada	1,321
The Royal Trust Company	Montreal, Quebec, Canada	858
Royal Trust Corporation of Canada	Toronto, Ontario, Canada	298

(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 US Group Holdings LLC and RBC USA Holdco Corporation which are incorporated under the laws of the State of Delaware, U.S., RBC Capital Markets, LLC, which is organized under the laws of the State of Minnesota, U.S., and RBC Finance S.à r.l. / B.V. is a company incorporated in the Netherlands with its official seat in Amsterdam, the Netherlands, and place of effective management, central administration, and principal establishment in Luxembourg, Grand Duchy of Luxembourg.
(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 have high intrinsic, or standalone, financial strength, and thus subject to very low credit risk absent any possibility of extraordinary support from an affiliate or a government. ● Obligations rated 'A' are judged to be upper-medium grade intrinsic, or standalone, financial strength, and thus subject to lower credit risk absent any possibility of extraordinary support from an affiliate or a government. ● Issuers assessed Baa are judged to have medium-grade intrinsic, or standalone, financial strength, and thus subject to moderate credit risk and, as such, may possess certain speculative credit elements absent any possibility of extraordinary support from an affiliate or a government. ● Issuers (or supporting institutions) rated Prime-1 have a superior ability to repay short-term debt obligations. ● 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.	A rating outlook is an opinion regarding the likely direction of an issuer's rating 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' has strong capacity to meet its financial commitments but is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. ● The addition of a plus or minus sign shows the relative standing within the major rating categories. ● An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation. ● A short term obligation rated 'A-1+' has extremely strong capacity to meet its financial commitments.	A rating outlook assesses the potential direction of a long-term credit rating over the intermediate term (typically six months to two years) and is not necessarily a precursor of a rating change.
Fitch	● 'AA' ratings denote expectations of very low credit risk and are judged to be of very high credit quality. They indicate very strong capacity for payment of financial commitments. This capacity is not significantly vulnerable to foreseeable events. ● The modifiers "+" or "-" may be appended to a rating to denote relative status within major rating categories. ● An obligation rated 'F1' has the highest short-term credit quality. It indicates the strongest intrinsic capacity for timely payment of financial commitments. The modifier '+' denotes any exceptionally strong credit feature.	Rating Outlooks indicate the direction a rating is likely to move over a one- to two-year period and does not imply that a rating change is inevitable.

Institution	Rating	Outlook
DBRS	● An obligation rated 'AA' is of superior credit quality. The capacity for the payment of financial obligations is considered high and it is unlikely to be significantly vulnerable to future events. In many cases they differ from obligations rated 'AAA' only to a small degree. An obligation rated A is of good credit quality, but of lesser credit quality than AA, and may be vulnerable to future events. ● Preferred shares rated Pfd-1 are of superior credit quality and are supported by entities with strong earnings and balance sheet characteristics. Pfd-1 securities generally correspond with companies whose senior bonds are rated in the AAA or AA categories. ● Preferred shares rated Pfd-2 are of satisfactory credit quality. Protection of dividends and principal is still substantial, but earnings, balance sheet and coverage ratios are not as strong as Pfd-1 rated companies. Generally, Pfd-2 ratings correspond with companies whose senior bonds are rated in the A category. R-1 (high) is 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. ● Each rating category is denoted by the subcategories high and low. The absence of either a "high" or "low" designation indicated the rating is in the middle of the category.	A Positive or Negative Trend is not an indication that a rating change is imminent. Rather, a Positive or Negative Trend represents an indication that there is a greater likelihood that the rating could change in the future.

Institution	Rating	Outlook
Kroll Bond Rating Agency	● An obligation rated 'AA' is determined to have minimal risk of loss due to credit-related events. Such obligors and obligations are deemed very high quality. ● A short-term obligation rated K1 has a very strong ability to meet short-term obligations. ● The modifiers "-" or "+" may be appended to ratings in categories AA through CCC to indicate, respectively, upper and lower risk levels within the broader category.	A rating outlook is an indication of the likely direction of an issuer's rating over the medium term, generally encompassing a horizon not to exceed two years and is not necessarily a precursor to a rating change.

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
(hereinafter referred to as the "Bank")
October 19, 2017

AUDIT COMMITTEE MANDATE

A. PURPOSE AND DUTIES OF THE COMMITTEE

1. General Purpose

The Audit 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; and

k) at least annually, obtain and review a report by the external auditor describing: (i) the external auditor's internal quality-control procedures; and (ii) 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 effectiveness of each of the CFO, CCO, CAMLO and CAE and 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; and

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 establish and monitor procedures to provide disclosure of information to customers and for dealing with customer complaints as required by the *Bank Act*;

d) 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;

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

f) 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 or the CFO. 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 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. 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*.

8. 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.

9. 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 General Counsel, to discuss any matters that the Committee or these parties believe should be discussed.

10. 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 October 19, 2016)

Mandate

1. The mandate of the Audit Committee established by the Board of Directors ("Board") confers on the 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 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 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 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 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.

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 Committee;
    b) permissible non-audit services to be provided by the auditors that have not otherwise been approved by the 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 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.

Responsibilities of External Auditors

15. 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 Committee on independence on a regular basis, and at least annually;
    d) provide for 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 Committee on an annual basis.

Engagements

16. 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.

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

18. 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.

19. 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 the foregoing;
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 Committee.

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

Tax Services

20. 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.

21. 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 25 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.

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 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

23. 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

24. 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

25. 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 25 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

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

No Delegation to Management

27. 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

28. These updated Policies and Procedures are effective as and from October 19, 2016.

Disclosure

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

Review

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

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, 2019, compared to the preceding fiscal year. This MD&A should be read in conjunction with our 2019 Annual Consolidated Financial Statements and related notes and is dated December 3, 2019. All amounts are in Canadian dollars, unless otherwise specified, and are based on financial statements prepared 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 2019 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 does not form part of this report. All references in this report to websites are inactive textual references and are for your information only.

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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 2019 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., European and global economies, the regulatory environment in which we operate, the Strategic priorities and Outlook sections for each of our business segments, and the risk environment including our liquidity and funding risk, 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", "plan" and "project" and similar expressions of future or conditional verbs such as "will", "may", "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 and that our financial performance objectives, vision and strategic goals will not be achieved. 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, strategic, reputation, legal and regulatory environment, competitive and systemic risks and other risks discussed in the risk sections of this 2019 Annual Report including information technology and cyber risk, privacy, data and third-party related risks, geopolitical uncertainty, Canadian housing and household indebtedness, regulatory changes, digital disruption and innovation, climate change, the business and economic conditions in the geographic regions in which we operate, the effects of changes in government fiscal, monetary and other policies, tax risk and transparency, and environmental and social risk.

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 2019 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 2019 Annual Report.

Selected financial and other highlights

Table 1

(Millions of Canadian dollars, except per share, number of and percentage amounts)	2019	2018	2019 vs. 2018 Increase (decrease)	
Total revenue	$ 46,002	$ 42,576	$ 3,426	8.0%
Provision for credit losses (PCL)	1,864	1,307	557	42.6%
Insurance policyholder benefits, claims and acquisition expense (PBCAE)	4,085	2,676	1,409	52.7%
Non-interest expense	24,139	22,833	1,306	5.7%
Income before income taxes	15,914	15,760	154	1.0%
Net income	$ 12,871	$ 12,431	$ 440	3.5%
Segments – net income				
Personal & Commercial Banking	$ 6,402	$ 6,028	$ 374	6.2%
Wealth Management	2,550	2,265	285	12.6%
Insurance	806	775	31	4.0%
Investor & Treasury Services	475	741	(266)	(35.9)%
Capital Markets	2,666	2,777	(111)	(4.0)%
Corporate Support	(28)	(155)	127	n.m.
Net income	$ 12,871	$ 12,431	$ 440	3.5%
Selected information				
Earnings per share (EPS) – basic	$ 8.78	$ 8.39	$ 0.39	4.6%
– diluted	8.75	8.36	0.39	4.7%
Return on common equity (ROE) (1) (2)	16.8%	17.6%	n.m.	(80) bps
Average common equity (1)	$ 75,000	$ 68,900	$ 6,100	8.9%
Net interest margin (NIM) – on average earning assets, net (3)	1.61%	1.64%	n.m.	(3) bps
PCL on loans as a % of average net loans and acceptances	0.31%	0.23%	n.m.	8 bps
PCL on performing loans as a % of average net loans and acceptances	0.04%	0.03%	n.m.	1 bps
PCL on impaired loans as a % of average net loans and acceptances	0.27%	0.20%	n.m.	7 bps
Gross impaired loans (GIL) as a % of loans and acceptances	0.46%	0.37%	n.m.	9 bps
Liquidity coverage ratio (LCR) (4)	127%	123%	n.m.	400 bps
Capital ratios and Leverage ratio				
Common Equity Tier 1 (CET1) ratio	12.1%	11.5%	n.m.	60 bps
Tier 1 capital ratio	13.2%	12.8%	n.m.	40 bps
Total capital ratio	15.2%	14.6%	n.m.	60 bps
Leverage ratio	4.3%	4.4%	n.m.	(10) bps
Selected balance sheet and other information (5)				
Total assets	$ 1,428,935	$ 1,334,734	$ 94,201	7.1%
Securities, net of applicable allowance	249,004	222,866	26,138	11.7%
Loans, net of allowance for loan losses	618,856	576,818	42,038	7.3%
Derivative related assets	101,560	94,039	7,521	8.0%
Deposits (3)	886,005	836,197	49,808	6.0%
Common equity	77,816	73,552	4,264	5.8%
Total capital risk-weighted assets	512,856	496,459	16,397	3.3%
Assets under management (AUM)	762,300	671,000	91,300	13.6%
Assets under administration (AUA) (6)	5,678,000	5,533,700	144,300	2.6%
Common share information				
Shares outstanding (000s) – average basic	1,434,779	1,443,894	(9,115)	(0.6)%
– average diluted	1,440,682	1,450,485	(9,803)	(0.7)%
– end of period	1,430,096	1,438,794	(8,698)	(0.6)%
Dividends declared per common share	$ 4.07	$ 3.77	$ 0.30	8.0%
Dividend yield (7)	4.1%	3.7%	n.m.	40 bps
Dividend payout ratio	46%	45%	n.m.	100 bps
Common share price (RY on TSX) (8)	$ 106.24	$ 95.92	$ 10.32	10.8%
Market capitalization (TSX) (8)	151,933	138,009	13,924	10.1%
Business information (number of)				
Employees (full-time equivalent) (FTE)	82,801	81,870	931	1.1%
Bank branches	1,327	1,333	(6)	(0.5)%
Automated teller machines (ATMs)	4,600	4,537	63	1.4%
Period average US$ equivalent of C$1.00 (9)	$ 0.752	$ 0.776	$ (0.024)	(3.1)%
Period-end US$ equivalent of C$1.00	$ 0.759	$ 0.760	$ (0.001)	(0.1)%

(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) These measures 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.
(3) Commencing Q4 2019, the interest component and the accrued interest payable recorded on certain deposits carried at Fair Value Through Profit and Loss (FVTPL) previously presented in trading revenue and deposits, respectively, are presented in net interest income and other liabilities, respectively. Comparative amounts have been reclassified to conform with this presentation.
(4) LCR is the average for the three months ended for each respective period and is calculated in accordance with the Office of the Superintendent of Financial Institutions' (OSFI) Liquidity Adequacy Requirements (LAR) guideline. For further details, refer to the Liquidity and funding risk section.
(5) Represents year-end spot balances.
(6) AUA includes $15.5 billion and $8.1 billion (2018 – $16.7 billion and $9.6 billion) of securitized residential mortgages and credit card loans, respectively.
(7) Defined as dividends per common share divided by the average of the high and low share price in the relevant period.
(8) Based on TSX closing market price at period-end.
(9) Average amounts are calculated using month-end spot rates for the period.
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 85,000+ employees who 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 34 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. The meaningful relationships with our clients is underscored by the breadth of our products, 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 wealth management 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 solutions including creditor, life, health, home, auto, travel, wealth, and annuities to individuals as well as reinsurance advice and solutions, and business insurance services to business and group clients.
Investor & Treasury Services	Acts as a specialist provider of asset services, a leader in Canadian cash management and transaction banking services, and a provider of treasury services to institutional clients worldwide.
Capital Markets	Provides expertise in banking, finance and capital markets to corporations, institutional investors, asset managers, governments and central banks around the world. We serve clients from 70 offices in 15 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 high net worth 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 2019 against our business strategies and strategic goals, refer to the Business segment results section.

Economic, market and regulatory review and outlook – data as at December 3, 2019

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.

Canada

The Canadian economy is expected to grow by 1.6% in calendar 2019, which is down from a 1.9% increase in calendar 2018. Business investment has declined amid an uncertain global economic backdrop, rising trade tensions, and challenges in the energy sector. Strong labour market conditions and rising wages have supported household income growth, but consumer spending has been moderate due to elevated debt levels and higher debt service costs. While the Bank of Canada (BoC) has left its overnight rate unchanged at 1.75% since October 2018, Canadian borrowing costs have declined due to global central bank easing. The BoC has signaled a willingness to lower rates if the global outlook deteriorates further and weakness in manufacturing and investment spreads to the rest of the economy. Canadian GDP growth is expected to remain slightly below the economy's longer-run trend in calendar 2020 amid moderate growth in consumer spending and housing as well as slow business investment.

U.S.

The U.S. economy is expected to grow by 2.3% in calendar 2019, which is down from a 2.9% increase in calendar 2018. Consumer spending growth has remained strong, though the stimulative effect of 2018's tax cuts has faded. Job growth has slowed in calendar 2019 relative to calendar 2018 though the unemployment rate has declined further. Following sluggish growth in calendar 2018, housing activity continued to slow in early calendar 2019 due to the dragging impact from higher interest rates in 2018, but has picked up more recently with the Federal Reserve (Fed) cutting interest rates. Business investment growth has

slowed with rising trade tensions and uncertainty about the global economic outlook weighing on sentiment. The Fed cut its benchmark interest rate for the third time in calendar 2019 in October but signaled that further rate cuts are unlikely as long as the economic outlook evolves in line with its expectations. U.S. GDP growth is expected to slow further in calendar 2020 with business investment and exports remaining subdued while consumer spending is expected to increase at a more moderate, but still healthy rate.

Europe

Euro area GDP is expected to grow by 1.2% in calendar 2019, which is down from a 1.9% increase in calendar 2018. Growth in Germany, the euro area's largest economy, has slowed amid a sustained downturn in the industrial sector. Growth in other major euro area economies remains modest, with weakness in manufacturing generally being offset by stronger services sector activity. The European Central Bank (ECB) announced additional monetary policy stimulus in September, cutting its key interest rate further into negative territory and restarting quantitative easing. Growth in the U.K. is expected to slow to 1.3% in calendar 2019 from 1.4% in calendar 2018 as ongoing uncertainty about Brexit continues to weigh on business sentiment and investment. Euro area GDP growth is expected to remain steady at a relatively modest pace in 2020, with some help from slightly more stimulative fiscal policy, while growth in the U.K. economy is expected to slow further.

Financial markets

Government bond yields remain historically low due to low inflation and expectations that monetary policy will remain accommodative for an extended period. Monetary policy stimulus, and more recently optimism regarding U.S.-China and Brexit deals, has supported equity markets. Oil prices have been relatively flat in recent months as global demand concerns have offset geopolitical risks. Yield curves in Canada and the U.S. remain flat, suggesting investors remain concerned about the risk of an economic downturn.

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 to the extent practicable. 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, global trade agreements, legislative developments on data privacy, amendments to anti-money laundering regulations and the U.S., the U.K. and European regulatory reforms.

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. For further details on our framework and activities to manage risks, refer to the risk and Capital management sections.

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 relative position reflects the market's perception over a period of time of our overall performance relative to our peers.

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. By focusing on our medium-term objectives in our decision-making, we believe we will be well-positioned to provide sustainable earnings growth and solid returns to our common shareholders.

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% +	**9%**	**8%**
ROE of 16% +	**17.1%**	**17.3%**
Strong capital ratio (CET1) (3)	**11.5%**	**11.2%**
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.
(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.

For 2020, our medium-term financial performance objectives will remain unchanged.

We compare our TSR to that of a global peer group approved by our Board of Directors (the Board). The global peer group remains unchanged from last year and consists of the following 10 financial institutions:

- **Canadian financial institutions:** Bank of Montreal, Canadian Imperial Bank of Commerce, Manulife Financial Corporation, National Bank of Canada, Power Financial Corporation, 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	12% Top half	10% Top half
Peer group average (excluding RBC)	11%	8%

(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, 2016 to October 31, 2019 and October 31, 2014 to October 31, 2019, respectively.

Common share and dividend information — Table 4

For the year ended October 31	**2019**	2018	2017	2016	2015
Common share price (RY on TSX) – close, end of period	**$ 106.24**	$ 95.92	$ 100.87	$ 83.80	$ 74.77
Dividends paid per share	**4.00**	3.70	3.40	3.20	3.04
Increase (decrease) in share price	**10.8%**	(4.9)%	20.4%	12.1%	(6.5)%
Total shareholder return	**15.2%**	(1.0)%	25.0%	16.8%	(3.0)%

Financial performance

Overview

2019 vs. 2018

Net income of $12,871 million increased $440 million or 4% from a year ago. Diluted EPS of $8.75 was up $0.39 or 5% and ROE of 16.8% was down 80 bps. Our Common Equity Tier 1 (CET1) ratio was 12.1%, up 60 bps from a year ago.

Our results reflected strong earnings in Personal & Commercial Banking and Wealth Management, and solid results in Insurance, partially offset by lower results in Investor & Treasury Services and Capital Markets. Our results also reflected the impact in the prior year of the U.S Tax Reform which resulted in the write-down of net deferred tax assets, as well as an increase due to the impact of foreign exchange translation.

Personal & Commercial Banking earnings increased mainly due to average volume growth of 7% and higher spreads. These factors were partially offset by higher PCL and an increase in staff-related costs as well as technology and related costs.

Wealth Management results increased mainly due to higher average fee-based client assets, an increase in net interest income and a gain on the sale of the private debt business of BlueBay of $134 million (after-tax). These factors were partially offset by increased costs in support of business growth, higher variable compensation commensurate with revenue growth and higher PCL.

Insurance earnings were up mainly due to the impact of new longevity reinsurance contracts, partially offset by higher claims costs.

Investor & Treasury Services results decreased primarily due to lower funding and liquidity revenue, severance and related costs associated with repositioning of the business, as well as lower revenue from our asset services business.

Capital Markets results were down driven by lower revenue in Corporate and Investment Banking, higher PCL and higher technology and related costs. These factors were partially offset by a lower effective tax rate largely reflecting changes in earnings mix, higher revenue in Global Markets and the impact of foreign exchange translation.

Corporate Support net loss was $28 million, largely due to the impact of an unfavourable accounting adjustment, residual unallocated costs and unfavourable tax impacts, partially offset by asset/liability management activities. Net loss was $155 million in the prior year, largely due to the impact of the U.S. Tax Reform of $178 million as noted above, partially offset by asset/liability management activities.

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)	**2019 vs. 2018**
Increase (decrease):	
Total revenue	**$ 339**
PCL	**7**
Non-interest expense	**203**
Income taxes	**13**
Net income	**116**
Impact on EPS	
Basic	**$ 0.08**
Diluted	**0.08**

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)	2019	2018
U.S. dollar	**0.752**	0.776
British pound	**0.591**	0.578
Euro	**0.670**	0.654

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

Total revenue

Table 7

(Millions of Canadian dollars)	2019	2018
Interest and dividend income	**$ 41,333**	$ 33,021
Interest expense (1)	**21,584**	15,069
Net interest income	**$ 19,749**	$ 17,952
NIM (1)	**1.61%**	1.64%
Insurance premiums, investment and fee income	**$ 5,710**	$ 4,279
Trading revenue (1)	**995**	1,150
Investment management and custodial fees	**5,748**	5,377
Mutual fund revenue	**3,628**	3,551
Securities brokerage commissions	**1,305**	1,372
Service charges	**1,907**	1,800
Underwriting and other advisory fees	**1,815**	2,053
Foreign exchange revenue, other than trading	**986**	1,098
Card service revenue	**1,072**	1,054
Credit fees	**1,269**	1,394
Net gains on investment securities	**125**	147
Share of profit in joint ventures and associates	**76**	21
Other	**1,617**	1,328
Non-interest income	**$ 26,253**	$ 24,624
Total revenue	**$ 46,002**	$ 42,576

(1) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.

2019 vs. 2018

Total revenue increased $3,426 million or 8%, largely due to higher net interest income and an increase in insurance premiums, investment and fee income (Insurance revenue). Higher investment management and custodial fees and other revenue also contributed to the increase. The impact of foreign exchange translation also increased total revenue by $339 million. These factors were partially offset by lower underwriting and other advisory fees.

Net interest income increased $1,797 million or 10%, largely due to average volume growth and higher spreads in Personal and Commercial Banking and Wealth Management. Higher trading revenue and lending revenue in Capital Markets and the impact of foreign exchange translation also contributed to the increase. Net interest income was also impacted by lower funding and liquidity revenue, which was more than offset by the related gains on non-trading derivatives in Other revenue.

NIM was down 3 bps compared to last year mainly due to changes in average earning asset mix with volume growth primarily in reverse repos and lower funding and liquidity revenue. These factors were partially offset by improved spreads in Canadian Banking and Wealth Management. The impact associated with lower funding and liquidity revenue was more than offset by the related gains on non-trading derivatives in Other revenue.

Insurance revenue increased $1,431 million or 33%, mainly due to the change in fair value of investments backing our policyholder liabilities and business growth in International Insurance, both of which are largely offset by in PBCAE. Realized investment gains also contributed to the increase. These factors were partially offset by lower group annuity sales, which are largely offset in PBCAE.

Investment management and custodial fees increased $371 million or 7%, due to higher average fee-based client assets reflecting market appreciation and net sales, and the impact of foreign exchange translation.

Other revenue increased $289 million or 22%, primarily due to gains on non-trading derivatives in our funding and liquidity business, which were largely offset in Net interest income and a gain on the sale of the private debt business of BlueBay. The change in the fair value of the hedges related to our U.S. share-based compensation plans, which was largely offset in Non-interest expense, also contributed to the increase. These factors were partially offset by lower net gains in our non-trading investment portfolios. The prior year also included a gain related to the sale of a mutual fund product and its associated team, a favourable accounting adjustment related to City National and a gain related to the reorganization of Interac.

Underwriting and other advisory fees decreased $238 million or 12%, mainly due to lower equity origination primarily in North America and lower M&A largely in Europe and Canada.

Additional trading information

Table 8

(Millions of Canadian dollars)	2019	2018
Total trading revenue		
Net interest income (1)	$ 2,266	$ 1,960
Non-interest income (1)	995	1,150
Total trading revenue	$ 3,261	$ 3,110
Total trading revenue by product		
Interest rate and credit	$ 1,664	$ 1,573
Equities	1,037	1,014
Foreign exchange and commodities	560	523
Total trading revenue	$ 3,261	$ 3,110

(1) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.

2019 vs. 2018
Total trading revenue of $3,261 million, which is comprised of trading-related revenue recorded in Net interest income and Non-interest income, was up $151 million or 5%, mainly due to higher fixed income trading revenue across all regions and the impact of foreign exchange translation.

Provision for credit losses

2019 vs. 2018
Total PCL increased $557 million from the prior year.

PCL on loans increased $608 million or 47% from the prior year, mainly due to higher provisions on impaired loans in Personal & Commercial Banking, Capital Markets and Wealth Management. The PCL ratio on loans increased 8 bps.

For further details on PCL, refer to Credit quality performance in the Credit risk section.

Insurance policyholder benefits, claims and acquisition expense (PBCAE)

2019 vs. 2018
PBCAE of $4,085 million increased $1,409 million or 53% from the prior year, mainly reflecting the change in fair value of investments backing our policyholder liabilities and lower favourable investment-related experience. Business growth in International Insurance and higher claims costs also contributed to the increase. These factors were partially offset by lower group annuity sales and the favourable impact of new longevity reinsurance contracts.

Non-interest expense

Table 9

(Millions of Canadian dollars, except percentage amounts)	2019	2018
Salaries	$ 6,600	$ 6,077
Variable compensation	5,706	5,597
Benefits and retention compensation	1,876	1,779
Share-based compensation	418	323
Human resources	$ 14,600	$ 13,776
Equipment	1,777	1,593
Occupancy	1,635	1,558
Communications	1,090	1,049
Professional fees	1,305	1,379
Amortization of other intangibles	1,197	1,077
Other	2,535	2,401
Non-interest expense	$ 24,139	$ 22,833
Efficiency ratio (1)	52.5%	53.6%
Efficiency ratio adjusted (2)	53.6%	53.1%

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

2019 vs. 2018
Non-interest expense increased $1,306 million or 6%, primarily due to increased costs in support of business growth and higher staff-related costs, the impact of foreign exchange translation, as well as an increase in technology and related costs, including digital initiatives. Higher variable compensation commensurate with revenue growth, severance and related costs associated with repositioning of our Investor & Treasury Services business, and the change in fair value of our U.S. share-based compensation plans, which was largely offset in revenue, also contributed to the increase.

Our efficiency ratio of 52.5% decreased 110 bps from last year. Excluding the change in fair value of investments backing our policyholder liabilities, our efficiency ratio of 53.6% increased 50 bps from last year.

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

Income and other taxes

Table 10

(Millions of Canadian dollars, except percentage amounts)	2019	2018
Income taxes	**$ 3,043**	$ 3,329
Other taxes		
Value added and sales taxes	**$ 519**	$ 468
Payroll taxes	**738**	687
Capital taxes	**73**	80
Property taxes	**139**	132
Insurance premium taxes	**30**	29
Business taxes	**55**	37
	$ 1,554	$ 1,433
Total income and other taxes	**$ 4,597**	$ 4,762
Income before income taxes	**$ 15,914**	$ 15,760
Effective income tax rate	**19.1%**	21.1%
Effective total tax rate (1)	**26.3%**	27.7%

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

2019 vs. 2018
Income tax expense decreased $286 million or 9% from last year, primarily due to an increase in income from lower tax rate jurisdictions and the impact of the U.S. Tax Reform which resulted in the write-down of net deferred tax assets in the prior year. These factors were partially offset by higher income before income taxes.

The effective income tax rate of 19.1% decreased 200 bps, primarily due to an increase in income from lower tax rate jurisdictions and the impact of the U.S. Tax Reform which resulted in the write-down of net deferred tax assets in the prior year.

Other taxes increased $121 million or 8% from 2018, mainly due to higher value added and sales taxes commensurate with purchase activity, and higher payroll taxes driven by higher staff-related costs.

Client assets

Assets under administration
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 76% of total AUA, as at October 31, 2019, followed by our Wealth Management and Personal & Commercial Banking businesses with approximately 19% and 5% of total AUA, respectively.

2019 vs. 2018
AUA increased $144 billion or 3% compared to last year, mainly reflecting market appreciation and net sales.

The following table summarizes AUA by geography and asset class:

AUA by geographic mix and asset class — Table 11

(Millions of Canadian dollars)	2019	2018
Canada (1)		
Money market	$ 35,300	$ 31,800
Fixed income	752,000	706,800
Equity	652,000	635,700
Multi-asset and other	902,100	934,500
Total Canada	$ 2,341,400	$ 2,308,800
U.S. (1) (2)		
Money market	$ 26,500	$ 26,400
Fixed income	114,500	103,500
Equity	189,600	173,200
Multi-asset and other	226,700	193,400
Total U.S.	$ 557,300	$ 496,500
Other International (1)		
Money market	$ 44,100	$ 43,900
Fixed income	358,200	356,000
Equity	787,900	871,700
Multi-asset and other	1,589,100	1,456,800
Total International	$ 2,779,300	$ 2,728,400
Total AUA	$ 5,678,000	$ 5,533,700

(1) Geographic information is based on the location from where our clients are serviced.
(2) Amounts have been revised from those previously presented.

Assets under management
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. Performance fees are recorded when certain benchmarks or performance targets are achieved. These factors could lead to differences on fees earned by products and therefore net return by asset class may vary despite similar average AUM. Our Wealth Management segment is the primary business segment with approximately 99% of total AUM.

2019 vs. 2018
AUM increased $91 billion or 14% compared to last year, mainly reflecting market appreciation and net sales.

The following table presents the change in AUM for the year ended October 31, 2019:

Client assets – AUM — Table 12

	2019					2018
(Millions of Canadian dollars)	Money market	Fixed income	Equity	Multi-asset and other	Total	Total
AUM, beginning balance (1)	$ 25,000	$ 184,000	$ 79,100	$ 382,900	$ 671,000	$ 639,900
Institutional inflows	55,200	33,400	6,500	15,900	111,000	104,600
Institutional outflows	(51,700)	(32,300)	(3,000)	(18,100)	(105,100)	(98,600)
Personal flows, net	800	5,600	(1,100)	25,900	31,200	30,400
Total net flows	4,300	6,700	2,400	23,700	37,100	36,400
Market impact	500	16,900	9,400	33,200	60,000	(9,200)
Acquisition/dispositions	–	(100)	(900)	(4,500)	(5,500)	–
Foreign exchange	100	(600)	–	200	(300)	3,900
Total market, acquisition/dispositions and foreign exchange impact	600	16,200	8,500	28,900	54,200	(5,300)
AUM, balance at end of year	$ 29,900	$ 206,900	$ 90,000	$ 435,500	$ 762,300	$ 671,000

(1) Amounts have been revised from those previously presented.

Business segment results

Results by business segments

Table 13

(Millions of Canadian dollars, except percentage amounts)	2019 Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	2019 Total	2018 Total
Net interest income (2)	$ 12,653	$ 2,993	$ –	$ (44)	$ 4,043	$ 104	$ 19,749	$ 17,952
Non-interest income (2)	5,212	9,150	5,710	2,389	4,245	(453)	26,253	24,624
Total revenue	$ 17,865	$ 12,143	$ 5,710	$ 2,345	$ 8,288	$ (349)	$ 46,002	$ 42,576
PCL	1,448	117	–	–	299	–	1,864	1,307
PBCAE	–	–	4,085	–	–	–	4,085	2,676
Non-interest expense	7,768	8,813	606	1,725	5,096	131	24,139	22,833
Net income before income taxes	$ 8,649	$ 3,213	$ 1,019	$ 620	$ 2,893	$ (480)	$ 15,914	$ 15,760
Income tax	2,247	663	213	145	227	(452)	3,043	3,329
Net income	$ 6,402	$ 2,550	$ 806	$ 475	$ 2,666	$ (28)	$ 12,871	$ 12,431
ROE (3)	27.2%	17.4%	39.6%	13.2%	11.4%	n.m.	16.8%	17.6%
Average assets	$ 466,200	$ 98,500	$ 17,600	$ 146,100	$ 666,500	$ 41,300	$ 1,436,200	$ 1,294,900

(1) Net interest income, Non-interest income, Total revenue, Net income before income taxes, and Income tax are presented in Capital Markets on a teb basis. 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) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.
(3) This measure may not have a standardized meaning under 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.
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. In 2018, Corporate Support included the impact of the write-down of net deferred tax assets related to the U.S. Tax Reform.

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 net charges 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 estimated credit losses on all financial assets, except for financial assets classified or designated as fair value through profit or loss (FVTPL) and equity securities designated as fair value through other comprehensive income (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 2019 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 are the key aspects of how some of our business segments are managed and reported:

- Wealth Management reported results also 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 enterprise funding, securitizations, net charges associated with unattributed capital, and consolidation adjustments, including the elimination of the teb gross-up amounts.

Key performance and non-GAAP measures

Performance measures

Return on common equity

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. 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.

The following table provides a summary of our ROE calculations:

Calculation of ROE — Table 14

(Millions of Canadian dollars, except percentage amounts)	2019 Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	2019 Total	2018 Total
Net income available to common shareholders	$ 6,309	$ 2,498	$ 798	$ 461	$ 2,584	$ (59)	$ 12,591	$ 12,115
Total average common equity (1) (2)	23,200	14,350	2,000	3,500	22,750	9,200	75,000	68,900
ROE (3)	27.2%	17.4%	39.6%	13.2%	11.4%	n.m.	16.8%	17.6%

(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 enhance the comparability of our financial performance for the year ended October 31, 2019 with the results from last year. Non-GAAP measures 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.

Results excluding specified item

There were no specified items for the years ended October 31, 2019 and October 31, 2018. Our results for the year ended October 31, 2017 were impacted by the following specified item:

- Our share of a gain related to the sale by our payment processing joint venture Moneris of its U.S. operations to Vantiv, Inc., which was $212 million (before- and after-tax) and recorded in Personal & Commercial Banking.

The following tables provide calculations of our Personal & Commercial Banking and Canadian Banking results and measures excluding the specified item for the year ended October 31, 2017 for the purpose of calculating the adjusted operating leverage ratio for the year ended October 31, 2018, which is a non-GAAP measure:

Personal & Commercial Banking — Table 15

(Millions of Canadian dollars, except percentage amounts)	2017		
		Item excluded	
	As reported	Gain related to the sale by Moneris (1)	Adjusted
Total revenue	$ 15,863	$ (212)	$ 15,651
PCL	1,054	–	1,054
Non-interest expense	7,176	–	7,176
Net income before income taxes	$ 7,633	$ (212)	$ 7,421
Net income	$ 5,755	$ (212)	$ 5,543
Other information			
Non-interest expense	$ 7,176	$ –	$ 7,176
Total revenue	15,863	(212)	15,651
Efficiency ratio	45.2%		45.9%
Revenue growth rate	5.7%		4.3%
Non-interest expense growth rate	3.5%		3.5%
Operating leverage	2.2%		0.8%

(1) Includes foreign currency translation.

Canadian Banking — Table 16

(Millions of Canadian dollars, except percentage amounts)	2017		
		Item excluded	
	As reported	Gain related to the sale by Moneris (1)	Adjusted
Total revenue	$ 14,877	$ (212)	$ 14,665
PCL	1,016	–	1,016
Non-interest expense	6,423	–	6,423
Net income before income taxes	$ 7,438	$ (212)	$ 7,226
Net income	$ 5,571	$ (212)	$ 5,359
Other information			
Non-interest expense	$ 6,423	$ –	$ 6,423
Total revenue	14,877	(212)	14,665
Efficiency ratio	43.2%		43.8%
Revenue growth rate	6.2%		4.7%
Non-interest expense growth rate	3.8%		3.8%
Operating leverage	2.4%		0.9%

(1) Includes foreign currency translation.

Efficiency ratio excluding the change in fair value of investments in Insurance
Our efficiency ratio is impacted by the change in fair value of investments backing our policyholder liabilities, which is reported in revenue and largely offset in PBCAE.

The following table provides calculations of our consolidated efficiency ratio excluding the change in fair value of investments backing our policyholder liabilities:

Consolidated non-GAAP efficiency ratio — Table 17

(Millions of Canadian dollars, except percentage amounts)	**2019**			2018		
		Item excluded			Item excluded	
	As reported	**Change in fair value of investments backing policyholder liabilities**	**Adjusted**	As reported	Change in fair value of investments backing policyholder liabilities	Adjusted
Total revenue	**$ 46,002**	**$ (987)**	**$ 45,015**	$ 42,576	$ 435	$ 43,011
Non-interest expense	**24,139**	**–**	**24,139**	22,833	–	22,833
Efficiency ratio	**52.5%**		**53.6%**	53.6%		53.1%

Personal & Commercial Banking

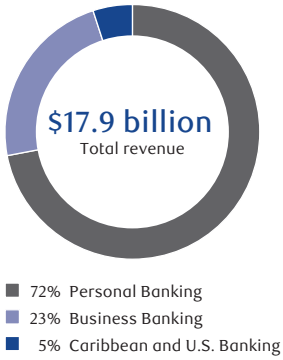
Personal & Commercial Banking provides a broad suite of financial products and services to individuals and businesses for their day-to-day banking, investing and financing needs. We are focused on building meaningful relationships with our clients, underscored by our exceptional client experience, the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

> 14 million
Number of clients

> 7 million
Active digital users in Canada[1]

35,467
Employees

Revenue by business lines



We operate through two businesses – Canadian Banking and Caribbean & U.S. Banking. Canadian Banking serves our home market in Canada, where we maintain top (#1 or #2) rankings in market share in this competitive environment for all key retail and business products. We have the largest branch network, the most ATMs and one of the largest mobile sales networks across Canada. 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 and auto financing companies.

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.

2019 Operating environment

- Following the rising interest rate environment throughout fiscal 2018, we experienced higher net interest margin this year. However, market interest rates moderated in the latter half of this year, as the overall economic outlook softened.
- Consumer spending has been supported by strong labour markets and income growth, though the impact of last year's interest rate increases has raised debt servicing costs for some Canadian households.
- Homebuyers have adjusted to stricter mortgage regulations and benefitted from declining mortgage rates this year. This has led to an improvement in housing activity, which has contributed to solid growth in residential mortgages this year.
- Business loan growth remained strong, however, it moderated slightly since the beginning of the calendar year. A decline in energy sector investment, an uncertain global growth environment and trade tensions have likely contributed to more modest growth in lending.
- After relatively benign credit conditions in the prior year, we returned to a more normalized level of credit losses towards the end of 2019.
- Growth in our investment product balances was driven by market returns, despite volatility experienced largely during the beginning of this year.
- Client expectations continue to evolve, driving the digitization of our business. As a result, we continued to invest in digital solutions to improve the client experience and deliver personalized advice.
- The Caribbean continued to experience challenges in various regions resulting in weak to moderate economic growth during the year.

(1) Represents 90-day active clients

Strategic priorities

OUR STRATEGY	PROGRESS IN 2019	PRIORITIES IN 2020
Transform how we serve our clients	Continued to provide exceptional and secure client experiences via our digital platforms, including a student mobile banking experience that is the first-of-its-kind in Canada Continued to innovate our branch network, including expansion of student and newcomer formats Continued to give clients more value for their loyalty points by offering the flexibility to pay bills with RBC Rewards® points	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
Accelerate our growth	Continued to provide personalized advice and valued banking solutions to our existing and new clients, including key high-growth and high-value segments such as retirees, youth, newcomers, business owners and high net worth clients Advanced our partnership with Petro-Canada, which helped our clients realize savings on gas while also earning RBC Rewards® and Petro-Canada points Continued to achieve exceptional growth while helping clients save money on travel with our WestJet credit card	Focus on engaging key high growth client segments and enabling our advisors to build new and deeper relationships and achieve industry-leading volume growth Establish key partnerships to continue to add value for our clients
Rapidly deliver digital solutions to our clients	Continued to release significant additional functionalities in our RBC Mobile app, including credit and debit card lock features Launched NOMI Budgets™ that leverages artificial intelligence (AI) to analyze clients' spending patterns to help them stay on track to achieve their financial goals Continued to roll out MyAdvisor®, an online advice platform that digitally connects our clients to an advisor, resulting in over 1.4 million clients with a personalized investment plan Continued to invest in InvestEase®, a low-cost automated investment advice and portfolio management business, with the launch of the responsible investing portfolio and no minimum requirement features Enhanced the digital experience for our business clients with the ability to open accounts online and obtain credit digitally as well as launched new capabilities allowing them to gain insights to grow their business with RBC Insight Edge™	Deliver more personalized insights to improve the client experience while continuing to simplify and digitize everyday banking Enhance the digital experience for our small business and commercial clients and make it easier for them to transact with us
Innovate to become a more agile and efficient bank	Continued to prioritize investments in programs that simplify, digitize and automate experiences for clients, as well as enabling employees to deliver relevant and expert advice	Invest in new tools and capabilities and proactively seek ways to simplify and streamline internal processes and the client experience
In the Caribbean	Continued to simplify operations, de-risk the business and improve internal controls, while transforming our business through digitization and physical footprint optimization	Become the premier digitally-enabled relationship bank while accelerating growth in key client segments, continue to transform the client experience to drive profitability and continue to simplify our operations
In the U.S.	Growth in U.S. cross-border client activity through the implementation of new account opening processes and continued leveraging of our brand marketing and sales enablement strategies driving accelerated growth	Deliver an improved digitally-enabled real estate lending experience, expand marketing and develop partnerships to provide personalized value to clients, and enhance the deposit gathering capabilities of the banking platform

Outlook

Canada's economy is expected to grow by 1.6% in calendar 2019, with a slightly stronger 1.7% pace in calendar 2020. Despite the BoC leaving its policy rate unchanged during fiscal 2019, market interest rates have declined, due in part to easing by other central banks globally. We expect the low interest rate environment, alongside a strong labour market and growing population, to continue to support housing demand in 2020. The impact of this is expected to be solid loan volume growth offset by interest margin compression. We will continue to pursue industry-leading volume growth, operational efficiency efforts and channel transformation to achieve our vision of being a digitally-enabled relationship bank.

In the Caribbean, we expect weak to moderate growth throughout the region. We will continue to de-risk the business, improve our operating efficiency and focus on growth strategies in target markets.

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 18

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2019	2018
Net interest income	$ 12,653	$ 11,776
Non-interest income	5,212	5,140
Total revenue	17,865	16,916
PCL on performing assets	109	115
PCL on impaired assets	1,339	1,158
PCL	1,448	1,273
Non-interest expense	7,768	7,526
Income before income taxes	8,649	8,117
Net income	$ 6,402	$ 6,028
Revenue by business		
Canadian Banking	$ 16,894	$ 15,970
Personal Banking	12,843	12,237
Business Banking	4,051	3,733
Caribbean & U.S. Banking	971	946
Key ratios		
ROE	27.2%	27.6%
NIM	2.84%	2.78%
Efficiency ratio	43.5%	44.5%
Operating leverage	2.4%	1.7%
Operating leverage adjusted (1)	n.a.	3.2%
Selected balance sheet and other information		
Average total assets	$ 466,200	$ 442,500
Average total earning assets, net	445,200	423,100
Average loans and acceptances, net	447,100	423,700
Average deposits	393,200	361,700
Other information		
AUA (2), (3)	$ 283,800	$ 266,500
Average AUA	276,100	271,800
AUM (3)	5,000	4,700
Number of employees (FTE)	35,467	35,573
Credit information		
PCL on impaired loans as a % of average net loans and acceptances	0.30%	0.26%
Other selected information – Canadian Banking		
Net income	$ 6,168	$ 5,860
NIM	2.79%	2.73%
Efficiency ratio	41.8%	42.5%
Operating leverage	2.0%	1.5%
Operating leverage adjusted (4)	n.a.	3.1%

(1) These are non-GAAP measures. Measures for the year ended October 31, 2018 have been adjusted by excluding our Q1 2017 share of the gain related to the sale of the U.S. operations of Moneris of $212 million (before- and after-tax). For further details, including a reconciliation, refer to the Key performance and non-GAAP measures section.
(2) AUA includes securitized residential mortgages and credit card loans as at October 31, 2019 of $15.5 billion and $8.1 billion, respectively (October 31, 2018 – $16.7 billion and $9.6 billion).
(3) Represents year-end spot balances.
(4) These are non-GAAP measures. The year ended October 31, 2018 operating leverage ratio in Canadian Banking of 1.5% was impacted by our share of the gain related to the sale of the U.S. operations of Moneris of $212 million (before- and after-tax) in the year ended October 31, 2017, which was a specified item. For further details, including a reconciliation, refer to the Key performance and non-GAAP measures section. The year ended October 31, 2018 revenue and expense growth rates in Canadian Banking were 7.3% and 5.8%, respectively. Excluding our share of the gain related to the sale of Moneris, as noted above, the year ended October 31, 2018 adjusted revenue growth rate was 8.9%.
n.a. not applicable

Financial performance

2019 vs. 2018

Net income increased $374 million or 6% from last year, mainly due to average volume growth of 7% and higher spreads. These factors were partially offset by higher PCL and an increase in staff-related costs as well as technology and related costs.

Total revenue increased $949 million or 6% from last year, largely reflecting average volume growth of 6% in loans and 9% in deposits and improved spreads.

NIM increased 6 bps, mainly due to improved spreads on deposits in Canadian Banking, reflecting higher interest rates, partially offset by the impact of competitive pricing pressures.

PCL increased $175 million or 14%, largely reflecting higher provisions on impaired loans in our commercial portfolios in Canadian Banking. PCL on impaired loans ratio increased 4 bps. For further details, refer to Credit quality performance in the Credit risk section.

Non-interest expense increased $242 million or 3%, primarily attributable to higher staff-related costs and an increase in technology and related costs, including digital initiatives.

Average loans and acceptances increased $23 billion or 6%, largely due to 6% growth in residential mortgages and 11% growth in business loans.

Average deposits increased $32 billion or 9%, reflecting 9% growth in both business and personal deposits.

Business line review

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, Guaranteed Investment Certificates (GICs), credit cards, and payment products and solutions.

We rank #1 or #2 in market share for all key Personal Banking products in Canada and our retail banking network is the largest in Canada with 1,201 branches and 4,240 ATMs. We have over 7 million credit card accounts and 23% market share of Canada's credit card purchase volume.

Financial performance

Total revenue increased $606 million or 5% compared to last year largely reflecting volume growth in deposits and residential mortgages and improved spreads on deposits, partially offset by the impact of competitive pricing pressures.

Average residential mortgages increased 6% compared to last year, mainly due to strong mortgage origination as well as high levels of client retention.

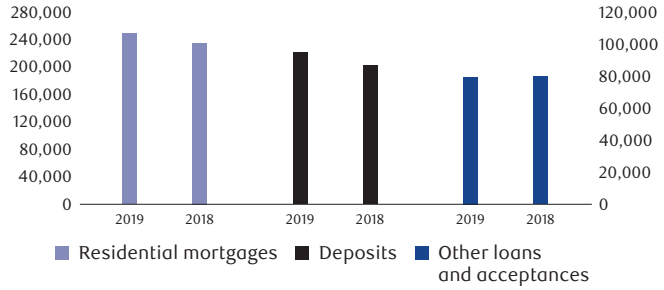
Average deposits increased 9% from last year, largely reflecting acquisitions of new clients and an increase in activity from existing clients.

Selected highlights — Table 19

(Millions of Canadian dollars, except number of)	2019	2018
Total revenue	**$ 12,843**	$ 12,237
Other information		
Average residential mortgages	**$ 249,600**	$ 235,700
Average other loans and acceptances, net	**79,800**	80,200
Average deposits	**221,400**	202,800
Average credit card balances	**19,100**	18,100
Credit card purchase volumes	**125,800**	117,900
Branch mutual fund balances (1)	**162,000**	147,900
Average branch mutual fund balances	**155,300**	151,500
AUA – Self-directed brokerage (1)	**89,500**	82,900
Number as at October 31:		
Branches	**1,201**	1,203
ATMs	**4,240**	4,194

(1) Represents year-end spot balances.

Average residential mortgages, personal 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

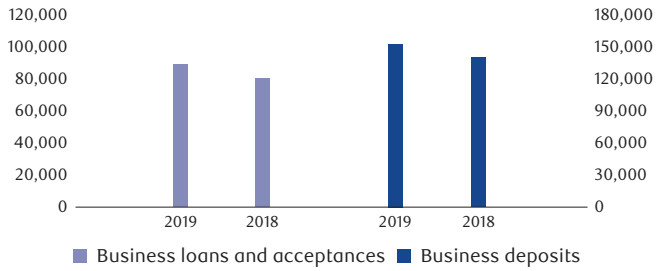
Total revenue increased $318 million or 9% compared to last year, largely reflecting average volume growth of 10%.

Average loans and acceptances increased 11% and average deposits were up 9%, mainly due to new account acquisitions as well as deepening of our existing client relationships.

Selected highlights — Table 20

(Millions of Canadian dollars)	2019	2018
Total revenue	**$ 4,051**	$ 3,733
Other information (average)		
Loans and acceptances, net	**$ 89,400**	$ 80,800
Deposits	**153,400**	140,600

Average business loans and acceptances and business 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 banking needs of our Canadian retail and small business clients in the U.S. across all 50 states.

Financial performance

Total revenue was up $25 million or 3% from last year, primarily due to the impact of foreign exchange translation.

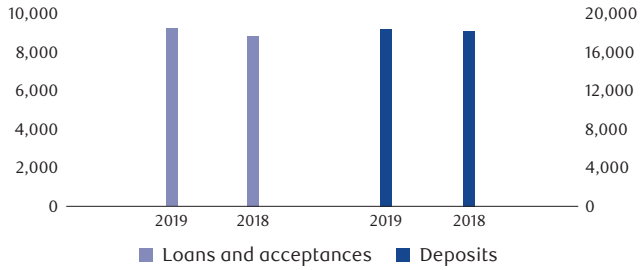
Average loans and acceptances increased 4% and average deposits increased 1%, primarily due to the impact of foreign exchange translation.

Selected highlights — Table 21

(Millions of Canadian dollars, except number of and percentage amounts)	2019	2018
Total revenue	$ 971	$ 946
Other information		
NIM	4.13%	3.95%
Average loans and acceptances, net	$ 9,300	$ 8,900
Average deposits	18,500	18,300
AUA (1)	6,700	7,700
Average AUA	7,100	8,200
AUM (1)	4,900	4,700
Number as at October 31:		
Branches	52	57
ATMs	287	269

(1) Represents year-end spot balances.

Average loans and deposits (Millions of Canadian dollars)



Wealth Management

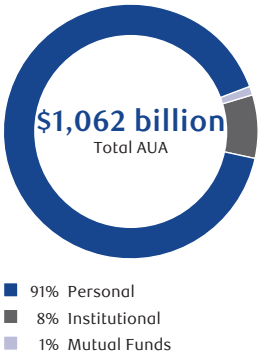
Wealth Management is a global business serving clients in key financial centres. We serve HNW and UHNW individual and institutional clients with a comprehensive suite of advice-based solutions and strategies to help them achieve their financial goals.

$12.1 billion
Total revenue

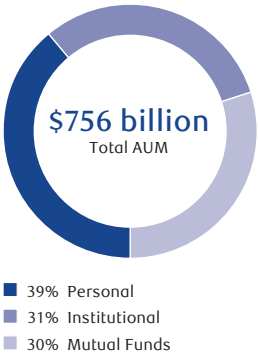
> 5,200
Client-facing advisors

> $22 billion
AUA net flows

Assets under Administration (AUA)



Assets under Management (AUM)



Our lines of businesses 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 correspondent and advisor services (CAS) businesses. PCG is the 7th largest full-service wealth advisory firm in the U.S., as measured by number of advisors, and City National is a premier U.S. private and commercial bank serving HNW, UHNW and commercial clients
- GAM is the largest retail fund company in Canada as well as a leading institutional asset manager
- International Wealth Management serves HNW and UHNW clients primarily through key financial centres in Europe, the U.K., and Asia

2019 Operating environment

- The Fed raised its policy rate once in the first half of the year, and subsequently made three cuts towards the latter part of 2019, resulting in a net reduction of 50 basis points in fiscal 2019. The resulting NIM compression in the latter part of the year was more than offset by strong volume growth and market appreciation in our U.S. businesses as we continued to grow in select U.S. markets.
- The wealth management industry continued to face the challenge of adapting in an environment of rapid technological advancements, shifting investor preferences, stricter regulations and changing demographics.
- Amid ongoing trade tensions and market volatility, growth in our client assets was driven by market returns, our relationship-focused advisory network, distribution scale and the strength of our brand.
- We continued to prioritize investments in digital solutions to maintain our competitive advantage, increase efficiencies in response to rapidly changing client preferences and address regulatory requirements.
- After relatively benign credit conditions in the prior year, we returned to a more normalized level of credit losses towards the end of 2019.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2019	PRIORITIES IN 2020
In Canada, be the premier service provider for HNW and UHNW clients	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 (e.g., delivery of Money in Motion and Financial Literacy programs) Fully rolled out RBC Premier Banking to deepen banking relationships with Wealth Management clients Enhanced our digital and data capabilities to drive increased client satisfaction and advisor productivity	Continue to retain and attract top-performing and new advisors to strengthen our talent advantage Deliver a differentiated client experience through enriched advisor-client interactions and compelling digital experiences Broaden and deepen client relationships by leveraging combined strengths across our other business segments Streamline and simplify the business to continue improving efficiency and advisor productivity
In the U.S., become the leading private and commercial bank and wealth manager in our key markets	Invested further in capabilities, technology and talent needed to grow our U.S. Wealth Management business, including solid execution on our technology transformation Continued expansion in City National's existing footprint, including growing our presence within the entertainment ecosystem through the acquisition of FilmTrack, as well as solid progress on expanding offerings to select high growth markets with strong U.S. Wealth Management and Capital Markets presence, including greater New York City and D.C. areas	Continue to strive 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 with a view to accelerating growth in the U.S. Build out digital capabilities to improve client experience and drive operational efficiencies
In select global financial centres, become the most trusted regional private bank	Enhanced our distribution capabilities by leveraging our global strengths, while delivering an exceptional client experience Focused on delivering a differentiated client experience by leveraging our global capabilities	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 Continue to increase business effectiveness and talent capabilities
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 Launched the RBC iShares strategic alliance, bringing Canadian investors the largest and most comprehensive ETF solution suite in Canada	Continue to evolve our product capabilities to meet existing client needs, while expanding our ability to reach a broader distribution landscape Build a sustainable and differentiated global institutional business which materially contributes to the success of GAM

Outlook

Global economies are likely to continue to experience uncertainty driven in part by ongoing geopolitical tensions and trade conflicts. Central banks in Canada and the U.S. are closely monitoring the impacts on the economy.

We expect our businesses will continue to lead in domestic markets and grow market share in the HNW and UHNW client segments globally, leveraging the strength of our brand and through continually enhancing our solutions and capabilities to address evolving client needs. We will continue to deliver world class client experiences by investing in our people and technology to drive digitized solutions.

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

Wealth Management — Table 22

(Millions of Canadian dollars, except number of, percentage amounts and as otherwise noted)	2019	2018
Net interest income	$ 2,993	$ 2,602
Non-interest income		
Fee-based revenue	6,903	6,447
Transaction and other revenue	2,247	1,877
Total revenue	12,143	10,926
PCL on performing assets	37	(19)
PCL on impaired assets	80	4
Total PCL	117	(15)
Non-interest expense	8,813	8,070
Income before income taxes	3,213	2,871
Net income	$ 2,550	$ 2,265
Revenue by business		
Canadian Wealth Management	$ 3,294	$ 3,048
U.S. Wealth Management (including City National)	6,112	5,419
U.S. Wealth Management (including City National) (US$ millions)	4,601	4,209
Global Asset Management	2,361	2,092
International Wealth Management	376	367
Key Ratios		
ROE	17.4%	16.3%
NIM	3.55%	3.45%
Pre-tax margin (1)	26.5%	26.3%
Selected balance sheet		
Average total assets	$ 98,500	$ 89,600
Average total earning assets, net	84,400	75,500
Average loans and acceptances, net	63,600	55,500
Average deposits	95,800	92,300
Other information		
AUA (2) (3)	$ 1,062,200	$ 970,500
AUM (2)	755,700	664,900
Average AUA	1,027,400	962,600
Average AUM	717,500	664,500
PCL on impaired loans as a % of average net loans and acceptances	0.13%	0.01%
Number of employees (FTE)	18,613	17,975
Number of advisors (4)	5,296	5,042

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

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2019 vs. 2018
Increase (decrease):	
Total revenue	$ 169
Non-interest expense	130
Net income	30
Percentage change in average U.S. dollar equivalent of C$1.00	(3)%
Percentage change in average British pound equivalent of C$1.00	2%
Percentage change in average Euro equivalent of C$1.00	2%

(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 $6,000 million (2018: $5,800 million) related to GAM.
(4) Represents client-facing advisors across all our wealth management businesses.

Client assets – AUA — Table 23

(Millions of Canadian dollars)	2019	2018
AUA, beginning balance	$ 970,500	$ 929,200
Asset inflows	315,500	292,600
Asset outflows	(293,400)	(261,600)
Total net flows	22,100	31,000
Market impact	72,100	5,600
Acquisitions/dispositions	(2,200)	(5,700)
Foreign exchange	(300)	10,400
Total market, acquisition/dispositions and foreign exchange impact	69,600	10,300
AUA, balance at end of year	$ 1,062,200	$ 970,500

Client assets – AUM — Table 24

(Millions of Canadian dollars)	2019 Money market	Fixed income	Equity	Multi-asset and other	Total	2018 Total
AUM, beginning balance (1)	$ 25,000	$ 182,000	$ 79,100	$ 378,800	$ 664,900	$ 634,100
Institutional inflows	55,200	33,400	6,500	15,900	111,000	104,500
Institutional outflows	(51,700)	(32,300)	(3,000)	(18,100)	(105,100)	(98,500)
Personal flows, net	800	5,700	(1,200)	25,700	31,000	30,200
Total net flows	4,300	6,800	2,300	23,500	36,900	36,200
Market impact	500	16,700	9,400	33,100	59,700	(9,200)
Acquisition/dispositions	–	(100)	(900)	(4,500)	(5,500)	–
Foreign exchange	100	(600)	–	200	(300)	3,800
Total market, acquisition/ dispositions and foreign exchange impact	600	16,000	8,500	28,800	53,900	(5,400)
AUM, balance at end of year	$ 29,900	$ 204,800	$ 89,900	$ 431,100	$ 755,700	$ 664,900

(1) Amounts have been revised from those previously presented.

AUA by geographic mix and asset class — Table 25

(Millions of Canadian dollars)	2019	2018
Canada (1)		
Money market	$ 23,200	$ 20,500
Fixed income	36,300	35,400
Equity	90,500	86,700
Multi-asset and other	255,800	225,300
Total Canada	$ 405,800	$ 367,900
U.S. (1) (2)		
Money market	$ 26,100	$ 26,000
Fixed income	114,500	103,500
Equity	189,600	173,300
Multi-asset and other	213,100	180,100
Total U.S.	$ 543,300	$ 482,900
Other International (1)		
Money market	$ 17,700	$ 16,100
Fixed income	13,500	12,300
Equity	39,500	49,100
Multi-asset and other	42,400	42,200
Total International	$ 113,100	$ 119,700
Total AUA	$ 1,062,200	$ 970,500

(1) Geographic information is based on the location from where our clients are served.
(2) Amounts have been revised from those previously presented.

Financial performance

2019 vs. 2018

Net income increased $285 million or 13%, from a year ago, mainly due to higher average fee-based client assets, an increase in net interest income and a gain on the sale of the private debt business of BlueBay of $134 million (after-tax). These factors were partially offset by increased costs in support of business growth, higher variable compensation commensurate with revenue growth and higher PCL.

Total revenue increased $1,217 million or 11%, primarily due to higher average fee-based client assets reflecting market appreciation and net sales, and an increase in net interest income largely driven by average loan growth of 15%, and higher spreads. The impact of foreign exchange translation, a gain on the sale of the private debt business of BlueBay of $151 million and the change in the fair value of the hedges related to our U.S. share-based compensation plans, which was largely offset in non-interest expense, also contributed to the increase.

PCL increased $132 million, primarily in U.S. Wealth Management (including City National). PCL on impaired loans ratio increased 12 bps, mainly in a few sectors, including consumer discretionary and consumer staples. For further details, refer to Credit quality performance in the Credit risk section.

Non-interest expense increased $743 million or 9%, primarily due to increased costs in support of business growth mainly reflecting higher staff-related costs and higher variable compensation commensurate with revenue growth. The impact of foreign exchange translation and the change in the fair value of our U.S. share-based compensation plans, which was largely offset in revenue, also contributed to the increase.

AUA and AUM increased $92 billion or 9% and $91 billion or 14%, respectively, primarily due to market appreciation 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 1,850 investment advisors providing comprehensive financial solutions to HNW and UHNW clients.

Additionally, we provide discretionary investment management and estate and trust services to our clients through approximately 90 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

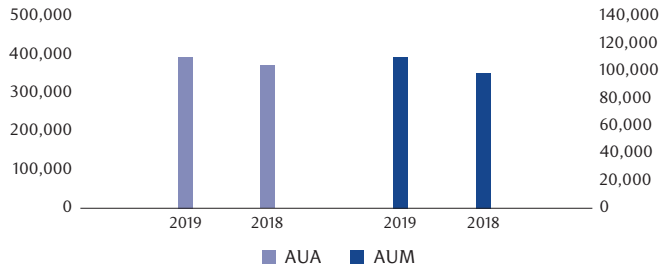
Revenue increased $246 million or 8% from a year ago, primarily due to higher average fee-based client assets reflecting market appreciation and net sales and the impact of a favourable accounting adjustment.

Selected highlights — Table 26

(Millions of Canadian dollars)	2019	2018
Total revenue	**$ 3,294**	$ 3,048
Other information		
Average loans and acceptances, net	**$ 3,700**	$ 3,600
Average deposits	**17,100**	17,300
AUA (1)	**407,000**	368,900
AUM (1)	**116,700**	100,200
Average AUA	**391,100**	370,300
Average AUM	**109,400**	97,900

(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 CAS businesses. PCG is the 7th largest full-service wealth advisory firm in the U.S., as measured by number of advisors, with over 1,900 financial advisors. Our CAS businesses deliver 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, international banking, 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 $693 million or 13%. In U.S. dollars, revenue increased $392 million or 9%, mainly due to an increase in net interest income largely driven by average loan growth of 14% and higher spreads, an increase in average fee-based client assets reflecting market appreciation and net sales, and the change in the fair value of the hedges related to our U.S. share-based compensation plans, which was largely offset in non-interest expense.

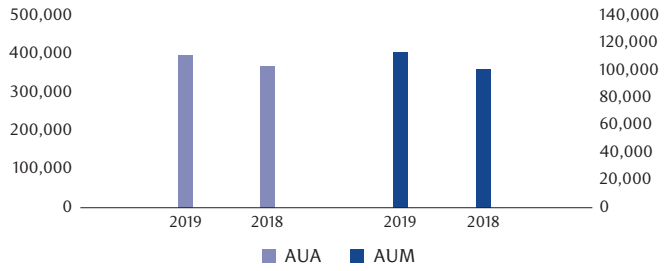
NIM increased 9 bps, mainly due to higher interest rates, partially offset by higher funding and deposit costs.

Selected highlights — Table 27

(Millions of Canadian dollars, except as otherwise noted)	2019	2018
Total revenue	**$ 6,112**	$ 5,419
Other information (Millions of U.S. dollars)		
Total revenue	**$ 4,601**	$ 4,209
NIM	**3.37%**	3.28%
Average earning assets, net	**$ 56,100**	$ 50,900
Average loans, guarantees and letters of credit, net	**42,400**	37,300
Average deposits	**50,200**	48,600
AUA (1)	**412,600**	367,100
AUM (1)	**123,700**	102,900
Average AUA	**393,900**	366,100
Average AUM	**112,800**	100,600

(1) Represents year-end spot balances.

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



Global Asset Management

Global Asset Management 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 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 of BlueBay and RBC Global 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 part of international banks as well as national and regional asset managers in the geographies where we serve clients.

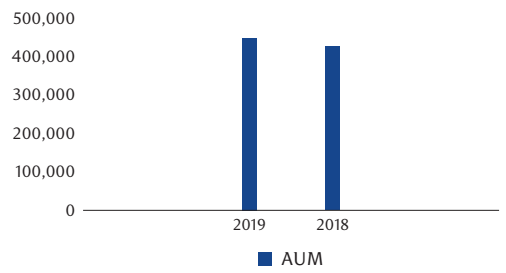
Financial performance
Revenue increased $269 million or 13%, mainly due to a gain on the sale of the private debt business of BlueBay of $151 million as we have focused on growing our core business and complementary strategies, and higher average fee-based client assets reflecting market appreciation and net sales.

Selected highlights — Table 28

(Millions of Canadian dollars)	2019	2018
Total revenue	**$ 2,361**	$ 2,092
Other information		
Canadian net long-term mutual fund sales (1)	**$ 8,263**	$ 5,908
Canadian net money market mutual fund sales (redemptions) (1)	**552**	562
AUM (2)	**467,200**	421,100
Average AUM	**449,700**	428,200

(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 Europe, the U.K., and Asia. We provide customized and integrated trust, banking, credit and investment solutions to HNW and UHNW clients and corporate clients in key financial centres in Europe, the U.K., and Asia. Competitors to our International Wealth Management business comprise global wealth managers, traditional offshore private banks, and domestic wealth managers.

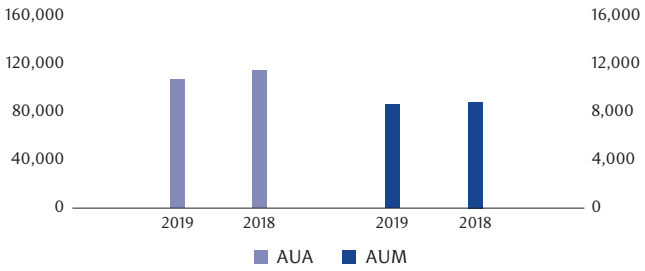
Financial performance
Revenue increased $9 million or 2%, primarily due to an increase in net interest income driven by higher spreads.

Selected highlights — Table 29

(Millions of Canadian dollars)	2019	2018
Total revenue	**$ 376**	$ 367
Other information		
Average loans, guarantees and letters of credit, net	**$ 4,400**	$ 4,800
Average deposits	**11,900**	12,500
AUA (1)	**105,900**	112,800
AUM (1)	**8,800**	8,300
Average AUA	**106,700**	114,300
Average AUM	**8,600**	8,800

(1) Represents year-end spot balances.

Average AUA and AUM (Millions of Canadian dollars)



Insurance

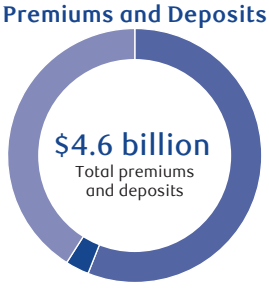
RBC Insurance® offers a wide range of solutions including creditor, life, health, home, auto, travel, wealth, and annuities to individuals as well as reinsurance advice and solutions, and business insurance services to business and group clients.

$5.7 billion
Total revenue

> 5 million
Number of clients

2,927
Employees

Premiums and Deposits



- 56% Life and Health
- 41% Annuity and Segregated Fund Deposits
- 3% Property and Casualty

RBC Insurance® is among the largest Canadian bank-owned insurance organizations and operates under two business lines: Canadian Insurance and International Insurance.

In Canada, we offer our products and services through a wide variety of channels: advice centers, RBC Insurance stores, mobile advisors, digital, mobile and social platforms, independent brokers, and travel partners.

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

2019 Operating environment

- The insurance industry continued to face a number of challenges and opportunities, including changing client preferences and digital and mobile transformation impacting all aspects of the business. In Canada, provincial and federal regulators have expanded their focus on sales practices and fair treatment of customers. Insurers globally have been investing in products and building distribution capacity in order to achieve higher operational efficiencies and manage expenses. To overcome these challenges and take advantage of these opportunities, we continued to evolve our robust frameworks, controls, and risk culture to protect clients and meet the expectations of both federal and provincial regulators.
- We continued to invest in digital capabilities to enhance access and convenience, reduce costs and deliver value to clients beyond traditional insurance products and services.
- In Europe, life insurance companies are actively managing longevity risk to preserve capital and to mitigate the volatility of pension costs. As a result, the longevity reinsurance market has become highly competitive and attractive to many global reinsurers. We continued to achieve strong growth in this market within our risk tolerance.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2019	PRIORITIES IN 2020
Improve distribution effectiveness and efficiency	Launched the redesigned RBC Simplified Term Digital Application to our field sales and advice centres, improving reliability and simplifying the application process for our simplified term life insurance offering Completed a technology transformation initiative to deliver a single integrated platform, which provides a better experience for clients, employees and plan administrators Began testing new business models, concepts and product ideas focused on the underinsured market; in order to provide innovative ways for clients to acquire the coverage that they need	Continue to improve our distribution effectiveness and efficiency by enhancing our proprietary distribution channels and focusing on the delivery of technology and operational solutions
Deepen client relationships	Introduced the Family Compassionate Care Rider. This is a first of its kind in the Canadian insurance industry and provides an optional Individual Disability Insurance product rider, which pays a monthly benefit to the insured in the event of spousal/child terminal illness Launched an industry-first segregated fund assessment tool which allows advisors to guide clients through the process, ensuring product recommendations are aligned with clients' needs, goals and risk profile Launched mobile device coverage on selected Avion credit cards, providing protection to clients if a mobile device is lost, stolen or accidentally damaged	Deepen client relationships by continuing to be an innovative, client-focused provider of a full suite of insurance solutions for mass underserved, mass affluent and HNW clients
Simplify.Agile.Innovate	Launched the Fundamental Series disability electronic application to our proprietary sales and brokerage channels offering a streamlined, quick and seamless experience for users	Simplify and innovate by accelerating our digital initiatives' time-to-market, improving quality and cost effectiveness
Pursue select international opportunities to grow our reinsurance business	Achieved very strong growth in our longevity reinsurance business due to heightened market activity in 2019	Pursue niche opportunities in mortality and longevity markets to grow our reinsurance business within our risk tolerance

Outlook

The insurance industry will continue to experience substantial forces of change, innovation and disruption. In this rapidly evolving industry, we will seek to maintain our strength through investments in technology, product and service innovation and efficient digital distribution channels. We will also continue to re-define how we advise our clients to provide them peace of mind.

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

Insurance — Table 30

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2019	2018
Non-interest income		
Net earned premiums	$ 3,984	$ 4,032
Investment income (1)	1,569	30
Fee income	157	217
Total revenue	5,710	4,279
Insurance policyholder benefits and claims (1)	3,749	2,391
Insurance policyholder acquisition expense	336	285
Non-interest expense	606	602
Income before income taxes	1,019	1,001
Net income	$ 806	$ 775
Revenue by business		
Canadian Insurance	$ 3,643	$ 2,213
International Insurance	2,067	2,066
Key ratios		
ROE	39.6%	39.3%
Selected balance sheet and other information		
Average total assets	$ 17,600	$ 15,800
Other information		
Premiums and deposits (2)	$ 4,604	$ 4,647
Canadian Insurance	2,415	2,584
International Insurance	2,189	2,063
Insurance claims and policy benefit liabilities	$ 11,401	$ 10,000
Fair value changes on investments backing policyholder liabilities (1)	987	(435)
Number of employees (FTE)	2,927	2,964

(1) Investment income can experience volatility arising from 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 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 Insurance policyholder benefits, claims and acquisition expense (PBCAE).

(2) Premiums and deposits include premiums on risk-based insurance and annuity products, and individual and group segregated fund deposits, consistent with insurance industry practices.

Financial performance

2019 vs. 2018

Net income increased $31 million or 4% from a year ago, mainly due to the impact of new longevity reinsurance contracts, partially offset by higher claims costs.

Total revenue increased $1,431 million or 33%, mainly due to the change in fair value of investments backing our policyholder liabilities and business growth in International Insurance, both of which are largely offset in PBCAE as indicated below. Realized investment gains also contributed to the increase. These factors were partially offset by lower group annuity sales, which are largely offset in PBCAE as indicated below.

PBCAE increased $1,409 million or 53%, mainly reflecting the change in fair value of investments backing our policyholder liabilities and lower favourable investment-related experience. Business growth in International Insurance and higher claims costs also contributed to the increase. These factors were partially offset by lower group annuity sales and the favourable impact of new longevity reinsurance contracts.

Non-interest expense increased $4 million or 1%.

Business line review

Canadian Insurance

We offer life, health, travel, home and auto insurance products (in partnership with Aviva Canada), wealth accumulation solutions, and payout annuities to individual, group, HNW and business clients across Canada. Our life and health portfolio includes universal life, term life, critical illness, disability, and group benefits such as long term disability, and health and dental. 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 with a goal to build our momentum and position us for growth in a product line where companies are increasingly looking to transfer the risks associated with their pension obligations to insurance companies – either through group annuity contract or longevity swap products.

In Canada, the majority of our competitors specialize in life and health or property and casualty products. We hold a leading market position in disability insurance products, have a significant presence in life and travel products, and have a growing presence in wealth solutions as well as in home and auto through our distribution agreement with Aviva.

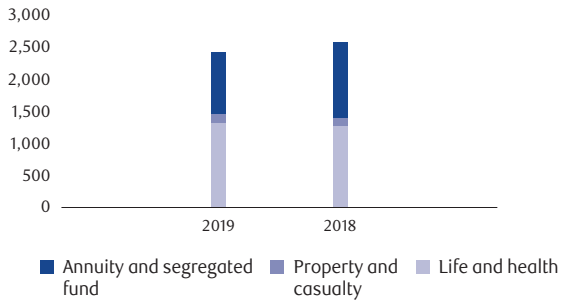
Financial performance

Total revenue increased $1,430 million or 65% from last year, primarily reflecting the change in fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE, and realized investment gains. These factors were partially offset by lower group annuity sales, which is largely offset in PBCAE.

Premiums and deposits decreased $169 million or 7%, as lower group annuity sales were partially offset by growth across other product lines.

Selected highlights		Table 31
(Millions of Canadian dollars)	**2019**	2018
Total revenue	**$ 3,643**	$ 2,213
Other information		
Premiums and deposits		
Life and health	**$ 1,328**	$ 1,280
Property and casualty	**131**	126
Annuity and segregated fund deposits	**956**	1,178
Fair value changes on investments backing policyholder liabilities	**1,099**	(434)

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 products.

The global reinsurance market is competitive and is dominated by a few large players, with significant presence in the U.S., the U.K. and Europe.

Financial performance

Total revenue increased $1 million due to business growth, primarily in longevity reinsurance and higher favourable reinsurance contract renegotiations. These factors were offset by the change in the fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE.

Premiums and deposits increased $126 million or 6%, reflecting growth in longevity reinsurance.

Selected highlights		Table 32
(Millions of Canadian dollars)	**2019**	2018
Total revenue	**$ 2,067**	$ 2,066
Other information		
Premiums and deposits		
Life and health	**$ 1,254**	$ 1,225
Property and casualty	**(1)**	(5)
Annuity	**936**	843
Fair value changes on investments backing policyholder liabilities	**(112)**	(1)

Investor & Treasury Services

Investor & Treasury Services is a specialist provider of asset services, a leader in Canadian cash management and transaction banking services, and a provider of treasury services to institutional clients worldwide.

$4.3 trillion
Assets under administration

13.2%
Return on equity

$58.8 billion
Average client deposits

Revenue by Geography

- 43% North America
- 30% Europe (Ex. U.K.)
- 14% U.K.
- 13% Asia-Pacific

We deliver asset, transaction banking, treasury, and other services to safeguard client assets, maximize liquidity, and manage risk across multiple jurisdictions. While we compete against the world's largest global custodians, we remain a specialist provider with a focus on providing best-in-class asset services to sophisticated investors. We compete in selected countries in North America, Europe, the U.K., and Asia-Pacific.

We specialize in creating digitally-enabled client-centric products and services. We have top-rated global custody, transfer agency and securities lending products. We are a leading provider of Canadian dollar cash management, correspondent banking and trade finance for financial institutions globally and we provide short-term funding and liquidity management for the bank.

2019 Operating environment

- Investments to execute efficiency opportunities and improve the client experience drove higher costs. In Q4, we recognized severance and related costs associated with repositioning of the business to improve cost structures and drive efficiencies.
- Results in our asset services business reflected challenging market conditions in the earlier part of 2019 and secular industry headwinds.
- The outlook on interest rates drove lower earnings in treasury services and resulted in margin compression associated with our client deposits.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2019	PRIORITIES IN 2020
Be #1 in Canada	Increased AUA in Canada by 5% year-over-year	Continue to grow income and market share among Canadian asset managers, investment counsellors, pension funds, insurance companies and transaction banking clients
Lead in selected fast growing asset servicing segments and markets to support our clients' growth	Continued to expand relationships in our chosen markets, fueling our business in Luxembourg and Ireland	Compete in segments and markets which offer the highest risk-adjusted returns
Deliver seamless digital client experiences and employ technology to enable our clients' success	Continued to invest in infrastructure and automation to increase the robustness of our technology platforms Rolled-out new functionality on our web-based portal (RBC One®), which provides clients with access to data, dynamic reporting and analytics Provided clients with secure, flexible access to their data via Application Program Interfaces (APIs) Enhanced our alternative asset services offering	Continue to provide our clients with seamless digital journeys and secure, robust and continuous service Design and re-engineer our services to improve client satisfaction, efficiency and risk controls Continue to use technology and data insights to solve our clients' current and future challenges

Outlook

In 2020, our focus is to enable our clients' success and to be the best at what we do in our chosen markets, by operating as one highly-skilled and client-focused team. We will execute on our repositioning initiatives with the aim to return to growth and higher levels of profitability. While we expect the global asset services industry to remain challenging in the near-term, our specialized products and services are well-positioned to grow in the continuously changing operating environment. We will continue to deliver class-leading capabilities to our clients by creating a culture of quality, collaboration and innovation, and focusing investment in digitally-enabled solutions.

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 33

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2019	2018
Net interest income	$ (44)	$ 297
Non-interest income	2,389	2,294
Total revenue	2,345	2,591
PCL	–	1
Non-interest expense	1,725	1,617
Net income before income taxes	620	973
Net income	$ 475	$ 741
Key Ratios		
ROE	13.2%	23.5%
Selected balance sheet information		
Average total assets	$ 146,100	$ 132,100
Average deposits	175,100	161,200
Average client deposits	58,800	58,600
Average wholesale funding deposits	116,300	102,600
Other Information		
AUA (1)	$ 4,318,100	$ 4,283,100
Average AUA	4,262,300	4,377,300
Number of employees (FTE)	4,684	4,846

(1) Represents year-end spot balances.

Financial performance
2019 vs. 2018

Net income decreased $266 million or 36%, primarily due to lower funding and liquidity revenue, severance and related costs, as well as lower revenue from our asset services business.

Total revenue decreased $246 million or 9%, mainly due to lower funding and liquidity revenue primarily driven by the impact of reduced money market opportunities in the current year and lower gains from the disposition of certain securities. Lower revenue from our asset services business due to challenging market conditions throughout the earlier part of 2019 and lower client activity also contributed to the decrease.

Non-interest expense increased $108 million or 7%, mainly due to severance and related costs associated with repositioning of the business.

Capital Markets

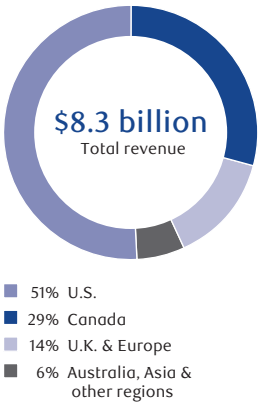
RBC Capital Markets® is a premier global investment bank providing expertise in banking, finance and capital markets to corporations, institutional investors, asset managers, governments and central banks around the world. Our professionals ensure that clients receive the advice, products, and services their businesses need from 70 offices in 15 countries. Our presence extends across North America, the U.K. & Europe, and Australia, Asia & other regions.

> 15,500
Number of clients

#10
Global league rankings[1]

4,269
Employees

Revenue by Geography



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

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

Outside North America, we have a select presence in the U.K. & Europe, Australia, Asia & other markets. In the U.K. & Europe, we offer a diversified set of capabilities in key sectors of expertise such as energy, mining, infrastructure, industrial, consumer, healthcare, technology and financial services. 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 finance and corporate and investment banking.

2019 Operating environment

- We saw an industry-wide decrease in investment banking activities in fiscal 2019 due to challenging market conditions. The market was negatively impacted by ongoing political and economic uncertainty, trade tensions and elevated equity valuations. The global investment banking fee pool was down 11 %[1] in fiscal 2019 compared to the prior year with decreases across the majority of products, most notably in loan syndication and equity origination activity. Despite the challenging industry environment, we improved our ranking to 10th place in global league tables[1].
- The trading environment at the beginning of fiscal 2019 was characterised by an increase in volatility, reflecting some of the factors noted above. The volatility benefited our equity derivatives business by driving higher client activity. We also saw lower liquidity and widening of credit spreads in the first two months of fiscal 2019 which drove lower corporate bond trading with a pickup in activity in January 2019. The second half of fiscal 2019 was characterized by heightened levels of market uncertainty which drove lower results in our equity and interest rate trading businesses. Overall, our trading businesses performed well despite a less favourable market environment in the current year.
- After relatively benign credit conditions in the prior year, we returned to a more normalized level of credit losses towards the end of 2019.

(1) Source: Dealogic, based on global investment bank fees, Fiscal 2019

Strategic priorities

OUR STRATEGY	PROGRESS IN 2019	PRIORITIES IN 2020
To be among the world's most successful investment banks by serving clients in the most attractive markets	Improved our ranking to 10th[1] place in the global league table Successfully maintained #1 market share position in Canada[1] and ranked Best Investment Bank in Canada[2] Successfully grew our M&A advisory practice which was reflected in attaining 10th place ranking for advising on announced U.S. M&A deals this year[3] U.K./Europe Equity Capital Markets (ECM) ranking improved to 16th place in the global league table, from 28th place in fiscal 2018[1]	Maintain our leadership position in Canada Continue to be the Canadian leader in the U.S., our largest market with the best opportunity for growth Continue to be a leader in targeted areas in the U.K., Europe and Asia-Pacific aligned with our global expertise
Deepen client relationships as an innovative, trusted partner	Continued focus on the largest users of our products and have strengthened our senior coverage teams in the U.S., the U.K. and Europe by adding more senior bankers to the platform Invested in technology and innovation to enhance existing capabilities to drive growth in our Global Markets business, including investment in an artificial intelligence powered platform Expanded and strengthened our product offering within the Global Markets business Continued to win significant mandates and won our largest-ever U.S. advisory mandate as sole financial advisor to Branch Banking and Trust Company (BB&T) in its merger of equals with SunTrust, a transaction with a value of US$66 billion when announced in February 2019	Support our clients by partnering with them to understand their strategic objectives and delivering solutions to achieve their goals Continue to grow and strengthen our senior coverage teams Focus on long-term client relationships aligned with our global capabilities Continue to drive technology innovations through our data strategy, electronification and artificial intelligence initiatives
Drive collaboration, simplify our business and optimize capital use to earn high risk-adjusted returns on assets and equity	Continued to drive increased collaboration across our geographies and businesses to provide our clients with holistic solutions Continued to focus on efficient deployment of our capital and growth throughout our businesses by reducing unproductive assets and re-allocating capital to businesses that provide higher returns and increased profitability Acted as exclusive financial advisor to Permira Funds on the acquisition of Cambrex Corporation and provided committed debt financing in support of the transaction valued at approximately US$2.4 billion	Collaborate to deliver clients our full suite of global products and services Continue to focus on deepening client relationships by driving cross business collaboration within RBC Capital Markets and across the enterprise Continue disciplined approach to managing costs and risk, maintain a balance between investment banking and trading revenue and align our resources around top client opportunities

Outlook

Despite a challenging market environment in fiscal 2019, we have made good progress on delivering on our strategic priorities. In our investment banking business, we have been successful in winning more and higher quality mandates. In 2020, we expect solid momentum in our investment banking business, driven by M&A fees as we are participating in a number of marquee transactions that have been announced across various sectors. Global Markets performed well in 2019 despite macro headwinds as we have a diversified geographic and product mix which can perform well even in challenging market environments. We expect these businesses to continue to see solid performances into 2020 by continuing to leverage investments in technology innovation, expanding and strengthening our product offering and focusing on ensuring financial resources are deployed appropriately to key target clients in an effort to maximize return. Our lending business will continue to focus on Risk Weighted Asset optimization and the execution of client plans. Although regulatory headwinds continue to impact earnings growth, we will look to drive strategic value from recent technology investments and continually optimize our capital deployment.

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

(1) Source: Dealogic, based on global investment bank fees, Fiscal 2019
(2) Source: Global Finance and Euromoney 2019
(3) Source: BNN Bloomberg based on announced M&A deals as at October 31, 2019

Capital Markets — Table 34

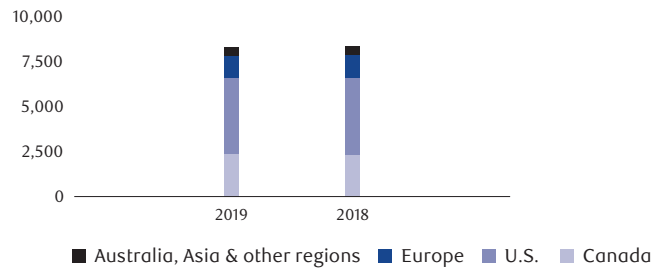
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2019	2018
Net interest income (1), (2)	$ 4,043	$ 3,328
Non-interest income (1), (2)	4,245	5,070
Total revenue (1)	8,288	8,398
PCL on performing assets	36	(13)
PCL on impaired assets	263	61
Total PCL	299	48
Non-interest expense	5,096	4,960
Net income before income taxes	2,893	3,390
Net income	$ 2,666	$ 2,777
Revenue by business		
Corporate and Investment Banking	$ 3,792	$ 4,113
Global Markets	4,663	4,496
Other	(167)	(211)
Key ratios		
ROE	11.4%	13.0%
Selected balance sheet and other information		
Average total assets	$ 666,500	$ 576,300
Average trading securities	102,100	95,800
Average loans and acceptances, net	99,800	85,000
Average deposits (2)	77,300	70,100
Other information		
Number of employees (FTE)	4,269	4,162
Credit information		
PCL on impaired loans as a % of average net loans and acceptances	0.26%	0.07%

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

(Millions of Canadian dollars, except percentage amounts)	2019 vs. 2018
Increase (decrease):	
Total revenue	$ 148
Non-interest expense	67
Net income	67
Percentage change in average U.S. dollar equivalent of C$1.00	(3)%
Percentage change in average British pound equivalent of C$1.00	2%
Percentage change in average Euro equivalent of C$1.00	2%

(1) The teb adjustment for 2019 was $450 million (2018 – $542 million). For further discussion, refer to the How we measure and report our business segments section.
(2) 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. Comparative amounts have been reclassified to conform with this presentation.

Revenue by region (Millions of Canadian dollars)



Financial performance

2019 vs. 2018

Net income decreased $111 million or 4%, driven by lower revenue in Corporate and Investment Banking, higher PCL and higher technology and related costs. These factors were partially offset by a lower effective tax rate largely reflecting changes in earnings mix, higher revenue in Global Markets and the impact of foreign exchange translation.

Total revenue decreased $110 million or 1%, largely due to lower loan syndication activity, lower equity origination primarily in North America, and lower M&A largely in Europe and Canada. These factors were partially offset by the impact of foreign exchange translation, lower residual funding costs and higher fixed income trading revenue across all regions.

PCL increased $251 million, driven by an increase in provisions on impaired loans in the oil & gas and industrial products sectors and higher provisions on performing loans. PCL on impaired loans ratio increased 19 bps. For further details, refer to Credit quality performance in the Credit risk section.

Non-interest expense increased $136 million or 3%, largely due to the impact of foreign exchange translation and higher technology and related costs, partially offset by lower compensation on decreased results.

Business line review

Corporate and Investment Banking

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

Financial performance

Corporate and Investment Banking revenue of $3,792 million decreased $321 million or 8% as compared to last year.

Investment banking revenue decreased $435 million or 21%, primarily due to lower loan syndication activity, lower M&A primarily in Europe and Canada, lower equity origination mainly in North America, and reduced municipal banking activity. These factors were partially offset by the impact of foreign exchange translation.

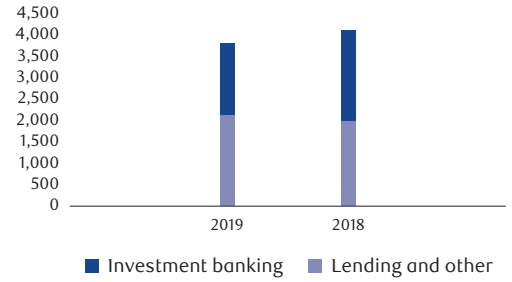
Lending and other revenue increased $114 million or 6%, reflecting the impact of foreign exchange translation, as well as increased client activity mainly in the U.S.

Selected highlights — Table 35

(Millions of Canadian dollars)	2019	2018
Total revenue (1)	**$ 3,792**	$ 4,113
Breakdown of revenue (1)		
Investment banking	**$ 1,672**	$ 2,107
Lending and other (2)	**2,120**	2,006
Other information		
Average assets	**$ 86,400**	$ 74,400
Average loans and acceptances, net	**76,700**	61,100

(1) The teb adjustment for the year ended October 31, 2019 was $80 million (October 31, 2018 – $224 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 fixed income, foreign exchange, equity sales and trading, repos and secured financing and commodities businesses.

Financial performance

Total revenue of $4,663 million increased $167 million or 4% as compared to last year.

Revenue in our Fixed income, currencies and commodities business increased $28 million or 1%.

Revenue in our Equities business increased $30 million or 3%, primarily due to higher equity trading revenue mainly in North America, partially offset by lower equity origination primarily in North America.

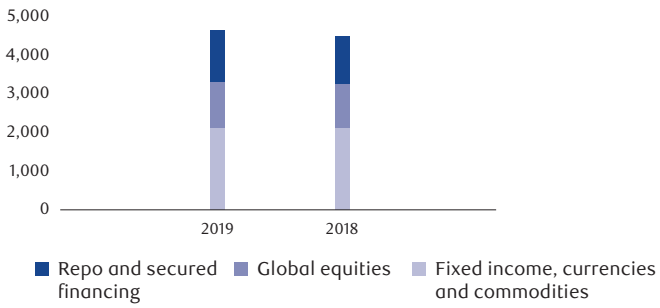
Revenue in our Repo and secured financing business increased $109 million or 9%, mainly due to increased client activity.

Selected highlights — Table 36

(Millions of Canadian dollars)	2019	2018
Total revenue (1)	**$ 4,663**	$ 4,496
Breakdown of revenue (1)		
Fixed income, currencies and commodities	**$ 2,150**	$ 2,122
Equities	**1,166**	1,136
Repo and secured financing (2)	**1,347**	1,238
Other information		
Average assets	**$ 583,700**	$ 508,900

(1) The teb adjustment for the year ended October 31, 2019 was $370 million (October 31, 2018 – $318 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 and structured rates in Asia.

Financial performance

Revenue increased $44 million or 21% as compared to last year, largely due to lower residual funding costs.

Corporate Support

Corporate Support consists of Technology & Operations, which provide 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 37

(Millions of Canadian dollars, except as otherwise noted)	2019	2018
Net interest income (loss) (1)	$ 104	$ (51)
Non-interest income (loss) (1)	(453)	(483)
Total revenue (1)	(349)	(534)
Non-interest expense	131	58
Income (loss) before income taxes (1)	(480)	(592)
Income taxes (recoveries) (1)	(452)	(437)
Net income (loss) (2)	$ (28)	$ (155)

(1) Teb adjusted.
(2) Net income reflects income attributable to both shareholders and Non-Controlling Interests (NCI). Net income attributable to NCI for the year ended October 31, 2019 was $(1) million (October 31, 2018 – $22 million).

Due to the nature of activities and consolidation adjustments reported in this segment, we believe that a comparative period analysis is not relevant. The following identifies material items affecting the reported results in each year.

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, 2019 was $450 million and was $542 million last year.

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

2019
Net loss was $28 million, largely due to the impact of an unfavourable accounting adjustment, residual unallocated costs and unfavourable tax impacts, partially offset by asset/liability management activities.

2018
Net loss was $155 million, largely due to the impact of the U.S. Tax Reform of $178 million which was primarily related to the write-down of net deferred tax assets, partially offset by asset/liability management activities.

Quarterly financial information

Fourth quarter performance

Q4 2019 vs. Q4 2018
Fourth quarter net income of $3,206 million was down $44 million or 1% from last year. Diluted EPS of $2.18 was down $0.02 and ROE of 16.2% was down 140 bps. Lower results in Investor & Treasury Services, Capital Markets and Insurance were partially offset by strong earnings in Wealth Management and Personal & Commercial Banking. Our results also reflected a net loss in Corporate Support.

Total revenue increased $701 million or 7%, largely due to the change in the fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE as indicated below, and an increase in net interest income reflecting average volume growth in Canadian Banking and U.S. Wealth Management (including City National), partially offset by lower spreads in U.S. Wealth Management (including City National), and a gain on the sale of the private debt business of BlueBay. Higher average fee-based client assets reflecting market appreciation and net sales, higher fixed income trading revenue, realized investment gains in Insurance, and the change in fair value of the hedges related to our U.S. share-based compensation plans, which was largely offset in non-interest expense, also contributed to the increase. These factors were partially offset by lower group annuity sales, which are largely offset in PBCAE as indicated below, and lower M&A and equity trading revenue in Capital Markets.

Total PCL increased $146 million and the PCL ratio on loans of 32 bps increased 9 bps from last year, due to higher provisions in Personal & Commercial Banking, Capital Markets, and Wealth Management. After relatively benign credit conditions in the prior year, we returned to a more normalized level of credit losses towards the end of 2019.

PBCAE increased $160 million or 32%, mainly due to the change in fair value of investments backing our policyholder liabilities, lower favourable investment-related experience, business growth and lower favourable reinsurance contract renegotiations. Lower favourable annual actuarial assumption updates, largely related to unfavourable mortality, morbidity and commission experience, partially offset by favourable economic assumptions, and higher claims costs also contributed to the increase. These factors were partially offset by lower group annuity sales and the favourable impact of new longevity reinsurance contracts.

Non-interest expense increased $437 million or 7%, mainly due to severance and related costs associated with repositioning of our Investor & Treasury Services business. Increased costs in support of business growth and higher staff-related costs, the change in the fair value of our U.S. share-based compensation plans, which was largely offset in revenue, and the impact of an unfavourable accounting adjustment in Corporate Support also contributed to the increase.

Income tax expense increased $2 million from last year. The effective income tax rate increased from 17.5% last year to 17.8%, mainly due to higher favourable tax adjustments in the prior year, partially offset by higher tax-exempt income in the current year.

Q4 2019 vs. Q3 2019

Net income of $3,206 million was down $57 million or 2% compared to the prior quarter, primarily due to severance and related costs associated with repositioning our Investor & Treasury Services business and higher PCL. Lower results in Capital Markets driven by lower M&A and lower equity origination, and the impact of an unfavourable accounting adjustment in Corporate Support also contributed to the decrease. These factors were partially offset by a gain on the sale of the private debt business of BlueBay, and the favourable impact of new longevity reinsurance contracts in the current quarter in Insurance.

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 38

(Millions of Canadian dollars, except per share and percentage amounts)	2019 Q4	2019 Q3	2019 Q2	2019 Q1	2018 Q4	2018 Q3	2018 Q2	2018 Q1
Personal & Commercial Banking	$ **4,568**	$ 4,546	$ 4,333	$ 4,418	$ 4,364	$ 4,284	$ 4,103	$ 4,165
Wealth Management	**3,187**	3,029	2,979	2,948	2,740	2,798	2,605	2,783
Insurance	**1,153**	1,463	1,515	1,579	1,039	1,290	806	1,144
Investor & Treasury Services	**566**	561	587	631	624	620	671	676
Capital Markets (2)	**1,987**	2,034	2,169	2,098	2,056	2,157	2,010	2,175
Corporate Support (2)	**(91)**	(89)	(84)	(85)	(154)	(124)	(141)	(115)
Total revenue	$ **11,370**	$ 11,544	$ 11,499	$ 11,589	$ 10,669	$ 11,025	$ 10,054	$ 10,828
PCL	**499**	425	426	514	353	346	274	334
PBCAE	**654**	1,046	1,160	1,225	494	925	421	836
Non-interest expense	**6,319**	5,992	5,916	5,912	5,882	5,858	5,482	5,611
Income before income taxes	$ **3,898**	$ 4,081	$ 3,997	$ 3,938	$ 3,940	$ 3,896	$ 3,877	$ 4,047
Income taxes	**692**	818	767	766	690	787	817	1,035
Net income	$ **3,206**	$ 3,263	$ 3,230	$ 3,172	$ 3,250	$ 3,109	$ 3,060	$ 3,012
EPS – basic	$ **2.19**	$ 2.23	$ 2.20	$ 2.15	$ 2.21	$ 2.10	$ 2.06	$ 2.02
– diluted	**2.18**	2.22	2.20	2.15	2.20	2.10	2.06	2.01
Effective income tax rate	**17.8%**	20.0%	19.2%	19.5%	17.5%	20.2%	21.1%	25.6%
Period average US$ equivalent of C$1.00	$ **0.755**	$ 0.754	$ 0.751	$ 0.749	$ 0.767	$ 0.767	$ 0.778	$ 0.794

(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.

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 results in lower client activity and may negatively impact the results of our Capital Markets brokerage business.

Trend analysis

Earnings have generally trended upward over the period. However, results in the first quarter of 2019 were impacted by challenging market conditions throughout the earlier part of the quarter. Quarterly earnings are also affected by the impact of foreign exchange translation.

Personal & Commercial Banking revenue has benefitted from solid volume growth since the beginning of the period. Higher spreads across the period reflecting higher interest rates have been partially offset by the impact of competitive pricing pressures. Overall, however, market interest rates have moderated in the latter half of the 2019.

Wealth Management revenue has generally trended upwards primarily due to growth in average fee-based client assets which benefitted from market appreciation and net sales. Net interest income has also increased largely driven by volume growth across the period and the impact of higher interest rates throughout the majority of the period. The impact of the U.S. Fed rate cuts resulted in lower spreads in the fourth quarter of 2019. A gain on the sale of the private debt business of BlueBay contributed to the increase in the fourth quarter of 2019. The change in the fair value of the hedges related to our U.S. share-based compensation plans, which is largely offset in Non-interest expense, also contributed to fluctuations in revenue over the period.

Insurance revenue fluctuated over the period, primarily due to the impact of changes in the fair value of investments backing our policyholder liabilities. Revenue has benefited from business growth in Canadian and International Insurance over the majority of the period with lower group annuity sales impacting the fourth quarter of 2019.

Investor & Treasury Services revenue has been impacted by fluctuations in market conditions and client activity across the period. The first half of 2018 trended higher due to generally higher market volatility, growth in client deposits, and increased client activity from our asset service business, combined with an improvement in funding and liquidity performance. Revenue from our funding and liquidity business was impacted by reduced money market opportunities in the current year and our asset services business was impacted by challenging market conditions during the first half of 2019. The latter part of the period was impacted by lower client activity and lower client deposit margins.

Capital Markets revenue is influenced, to a large extent, by market conditions that impact client activity in our Corporate and Investment Banking and Global Markets businesses, with the first quarter results generally stronger than the remaining quarters.

The second quarter of 2018 experienced lower equity originations driven by lower market activity, decreased fixed income trading across all regions, and lower equity trading revenue in the U.S. The decline experienced in the fourth quarter of 2018 largely resulted from lower fixed income trading revenue. Client activity in 2019 was impacted by challenging market conditions resulting in lower investment banking fee revenues experienced across the industry. The impact of challenging market conditions also resulted in lower equity trading revenue in the second half of 2019.

PCL on performing assets has fluctuated over the period as it is impacted by volume growth, changes in portfolio mix, model changes and macroeconomic conditions. PCL saw lower provisions and higher recoveries on impaired loans across a few sectors for the majority of 2018. The fourth quarter of 2018 was also impacted by the restructuring of portfolios in Barbados. After relatively benign credit conditions in 2018, we returned to a more normalized level of credit losses towards the end of 2019.

PBCAE has fluctuated quarterly as it includes the changes to the fair value of investments backing our policyholder liabilities and business growth, including the impact of group annuity sales, both of which are largely offset in Revenue. PBCAE has also fluctuated due to investment-related experience and claims costs over the period. Since late 2018, PBCAE has been positively impacted by favourable reinsurance contract renegotiations. Actuarial adjustments, which generally occur in the fourth quarter of each year, also impact PBCAE results.

While we continue to focus on efficiency management activities, Non-interest expense generally trended upwards over the period. Growth mainly reflects higher costs in support of business growth and our ongoing investments in technology and related costs, including digital initiatives, and higher staff-related costs, including variable compensation. The increase in the fourth quarter of 2019 reflected severance and related costs associated with repositioning of our Investor & Treasury Services business.

Our effective income tax rate has fluctuated over the period, mostly due to various levels of tax adjustments and changes in earnings mix. The first quarter of 2018 was adversely impacted by the U.S. Tax Reform, which resulted in the write-down of net deferred tax assets, however, this was more than offset during 2018 by the ongoing lower corporate tax rate. The first quarter of 2019 included a write-down of deferred tax assets resulting from a change in the corporate tax rate in Barbados.

Financial condition

Condensed balance sheets

Table 39

(Millions of Canadian dollars)	2019	2018
Assets		
Cash and due from banks	$ 26,310	$ 30,209
Interest-bearing deposits with banks	38,345	36,471
Securities, net of applicable allowance (1)	249,004	222,866
Assets purchased under reverse repurchase agreements and securities borrowed	306,961	294,602
Loans		
Retail	426,086	399,452
Wholesale	195,870	180,278
Allowance for loan losses	(3,100)	(2,912)
Other – Derivatives	101,560	94,039
– Other (2)	87,899	79,729
Total assets	$ 1,428,935	$ 1,334,734
Liabilities		
Deposits (3)	$ 886,005	$ 836,197
Other – Derivatives	98,543	90,238
– Other (2), (3)	350,947	319,213
Subordinated debentures	9,815	9,131
Total liabilities	1,345,310	1,254,779
Equity attributable to shareholders	83,523	79,861
Non-controlling interests	102	94
Total equity	83,625	79,955
Total liabilities and equity	$ 1,428,935	$ 1,334,734

(1) Securities are comprised of trading and investment securities.
(2) Other – Other assets and liabilities include Segregated fund net assets and liabilities, respectively.
(3) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

2019 vs. 2018

Total assets increased $94 billion or 7% from last year. Foreign exchange translation increased total assets by $2 billion.

Cash and due from banks was down $4 billion or 13%, mainly due to lower deposits with central banks, reflecting our short-term cash management activities.

Interest-bearing deposits with banks increased $2 billion or 5%, largely due to higher deposits with central banks, reflecting our cash management activities.

Securities, net of applicable allowance, were up $26 billion or 12%, largely driven by higher government debt securities, driven by client and business activities. Higher equity trading securities, reflecting favourable market conditions, also contributed to the increase.

Assets purchased under reverse repurchase agreements (reverse repos) and securities borrowed increased $12 billion or 4%, driven by client and business activities, partially offset by higher financial netting.

Loans (net of Allowance for loan losses) were up $42 billion or 7%, primarily due to volume growth, which was driven by higher residential mortgages loans and wholesale loans.

Derivative assets were up $8 billion or 8%, mainly attributable to higher fair values on interest rate contracts, partially offset by lower fair values on foreign exchange contracts.

Other assets were up $8 billion or 10%, driven by higher customers' liability under acceptances and higher commodities trading receivables, driven by client demand. Higher cash collateral also contributed to the increase.

Total liabilities increased $91 billion or 7% from last year. Foreign exchange translation increased total liabilities by $2 billion.

Deposits increased $50 billion or 6%, mainly as a result of higher business and retail deposits, driven by client activities.

Derivative liabilities were up $8 billion or 9%, mainly attributable to higher fair values on interest rate contracts, partially offset by lower fair values on foreign exchange contracts.

Other liabilities increased $32 billion or 10%, mainly attributable to higher obligations related to repurchase agreements due to increased client activity, partially offset by higher financial netting. Higher obligations related to securities sold short and higher acceptances also contributed to the increase.

Total equity increased $4 billion or 5% reflecting earnings, net of dividends and share repurchases, redemptions of preferred shares and the impact of lower discount rates on the remeasurement of our employee benefit plans, partially offset by favourable returns on plan assets.

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 2019, we did not derecognize any mortgages securitized through the NHA MBS program. As at October 31, 2018, we derecognized $1.3 billion of mortgages where both the NHA MBS and the residual interests in the mortgage pools were sold to third parties resulting in the transfer of substantially all of the risks and rewards. For further details, refer to Note 6 and Note 7 of our 2019 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, 2019, we securitized $696 million of commercial mortgages (October 31, 2018 – $352 million). Our continuing involvement with the transferred assets is limited to servicing certain of the underlying commercial mortgages sold. As at October 31, 2019, there was $1.9 billion of commercial mortgages outstanding that we continue to service related to these securitization activities (October 31, 2018 – $1.5 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 7 of our 2019 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 $254 million during the year (October 31, 2018 – $262 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 40

As at October 31 (Millions of Canadian dollars)	2019 Notional of committed amounts (1)	2019 Allocable notional amounts	2019 Maximum exposure to loss (2)	2018 Notional of committed amounts (1)	2018 Allocable notional amounts	2018 Maximum exposure to loss (2)
Backstop liquidity facilities	**$ 37,935**	**$ 36,229**	**$ 36,229**	$ 38,342	$ 36,193	$ 36,193
Credit enhancement facilities (3)	**1,706**	**1,706**	**1,706**	2,149	2,149	2,149
Total	**$ 39,641**	**$ 37,935**	**$ 37,935**	$ 40,491	$ 38,342	$ 38,342

(1) Based on total committed financing limit.
(2) Not presented in the table above are derivative assets with a fair value of $97 million (October 31, 2018 –$nil) which are a component of our total maximum exposure to loss from our interests in the multi-seller conduits. Refer to Note 7 of our 2019 Annual Consolidated Financial Statements for more details.
(3) Includes $14 million (October 31, 2018 - $22 million) of Financial standby letters of credit.

As at October 31, 2019, the notional amount of backstop liquidity facilities we provide decreased by $407 million or 1% from last year. The decrease as compared to last year was primarily due to lower outstanding securitized assets in the multi-seller conduits. The notional amount of partial credit enhancement facilities we provide decreased by $443 million from last year. The decrease in the credit enhancement facilities reflects lower client usage.

Maximum exposure to loss by client type — Table 41

As at October 31 (Millions of dollars)	2019 US$	2019 C$	2019 Total C$	2018 US$	2018 C$	2018 Total C$
Outstanding securitized assets						
Credit cards	**$ 4,258**	**$ 510**	**$ 6,117**	$ 4,406	$ 510	$ 6,308
Auto loans and leases	**9,003**	**2,882**	**14,738**	10,726	2,148	16,260
Student loans	**1,777**	**–**	**2,340**	1,707	–	2,246
Trade receivables	**2,338**	**–**	**3,079**	2,220	–	2,921
Equipment receivables	**1,479**	**–**	**1,948**	1,581	–	2,080
Consumer loans	**2,150**	**–**	**2,831**	1,387	–	1,825
Dealer floor plan receivables	**910**	**878**	**2,077**	833	852	1,948
Fleet finance receivables	**602**	**306**	**1,099**	614	306	1,113
Insurance premiums	**213**	**286**	**566**	122	194	355
Residential mortgages	**–**	**1,014**	**1,014**	–	1,377	1,377
Transportation finance	**1,498**	**153**	**2,126**	1,335	153	1,909
Total	**$ 24,228**	**$ 6,029**	**$ 37,935**	$ 24,931	$ 5,540	$ 38,342
Canadian equivalent	**$ 31,906**	**$ 6,029**	**$ 37,935**	$ 32,802	$ 5,540	$ 38,342

Our overall exposure decreased by 1% compared to last year, reflecting a decrease in the outstanding securitized assets of the multi-seller conduits. Correspondingly, total assets of the multi-seller conduits decreased by $398 million or 1% from last year, primarily due to decreases in the Auto loans and leases and Residential mortgages asset classes, which were offset by increases in the Consumer loans, Insurance premiums and Transportation finance asset classes. 100% of multi-seller conduits assets were internally rated A or above, consistent with last year. All transactions funded by the unconsolidated multi-seller conduits are internally rated using a rating system which is largely consistent with that of the external rating agencies.

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 the Canadian multi-seller conduits are reviewed by DBRS and Moody's. 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, 2019, the total asset-backed commercial paper (ABCP) issued by the conduits amounted to $23.8 billion, a decrease of $1.1 billion or 4.4% from last year. The decrease in the amount of ABCP issued by the multi-seller conduits compared to last year is primarily due to lower client usage. The rating agencies that rate the ABCP rated 100% (October 31, 2018 – 71%) of the total amount issued within the top ratings category.

Structured finance

We invest in auction rate securities (ARS) of certain trusts which fund their long-term investments in student loans by issuing short-term senior and subordinated notes. Our maximum exposure to loss in these ARS trusts as at October 31, 2019 was $60 million (October 31, 2018 – $176 million). The decrease in our maximum exposure to loss was primarily related to sales to third parties and redemptions.

We also provide liquidity facilities to certain municipal bond Tender Option Bond (TOB) trusts in which we have an interest but do not consolidate because the residual certificates issued by the TOB trusts are held by third parties. As at October 31, 2019, our maximum exposure to loss from these unconsolidated municipal bond TOB trusts was $3.1 billion (October 31, 2018 – $2.4 billion). The increase in our maximum exposure to loss relative to last year was primarily due to the addition of new trusts.

We provide senior warehouse financing to discrete unaffiliated structured entities that are established by third parties to acquire loans and issue term collateralized loan obligations (CLO). 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, 2019, our maximum exposure to loss associated with the outstanding senior warehouse financing facilities was $253 million (October 31, 2018 – $837 million). The decrease in our maximum exposure to loss relative to last year was related to the termination of existing financing facilities.

We provide senior financing to unaffiliated structured entities that are established by third parties to acquire loans. 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, 2019, our maximum exposure to loss associated with the outstanding senior financing facilities was $2.8 billion (October 31, 2018 – $1.8 billion). The increase in our maximum exposure to loss relative to last year was driven by the addition of new financing facilities.

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, 2019, our maximum exposure to loss was $1.8 billion (October 31, 2018 – $2.7 billion). The decrease in our maximum exposure to loss relative to last year was due to reduced holdings in third-party investment funds.

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, 2019, our maximum exposure to these funds was $275 million (October 31, 2018 – $275 million).

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, 2019, our maximum exposure to loss in these entities was $10.7 billion (October 31, 2018 – $10.2 billion). The increase in our maximum exposure to loss compared to last year reflects growth in the securitized assets in these entities and the impact of foreign currency translation. Interest and non-interest income earned in respect of these investments was $195 million (October 31, 2018 – $126 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, 2019 amounted to $380.3 billion compared to $392.7 billion last year. The decrease compared to last year was driven primarily by lower business activity in securities lending indemnifications partially offset by growth in both commitments to extend credit and financial standby letters of credit. Refer to Liquidity and funding risk and Note 25 of our 2019 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 strong risk conduct and risk-aware culture. Our view of risks is dynamic, reflecting 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 risks and emerging risks, as they evolve, are identified, managed, and incorporated into our existing risk management assessment, measurement, monitoring and escalation processes. These practices 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 separate definitions for *Top Risks* and *Emerging Risks*, as well as supplementary internal guidance, to support enterprise-wide identification and assessment of all material risks, including those that are not readily apparent.

- A **Top Risk** is a risk already identified and well understood that could materially impact our financial results, reputation, business model, or strategy in the short to medium term.
- An **Emerging Risk** is one that could materially impact our financial results, reputation, business model, or strategy, but is distinguished by a lack of clarity with respect to the probabilities, impacts, timing, and/or ranges of potential outcomes.

Top Risks	Description
Information Technology and Cyber Risks	Information technology (IT) and cyber risks remain as top risks, not only for the financial services sector, but for other industries worldwide. We are subject to heightened risks in the form of cyber-attacks, data breaches, cyber extortion and similar compromises, due to the size, scale, and global nature of our operations, our heavy reliance on the internet to conduct day-to-day business activities, our intricate technological infrastructure and our use of third party service providers. 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. As the volume and sophistication of cyber-attacks continue to increase, the resulting implications could include business interruptions, service disruptions, financial loss, theft of intellectual property and confidential information, litigation, enhanced regulatory attention and penalties, and 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 our risks effectively. For details on how we are managing these risks, refer to the Operational risk section.
Privacy, Data and Third Party Related Risks	The management, use, and protection of data is a top risk given the high value attributed to data and the potential exposure to operational risks, reputational risks, and regulatory compliance risks. The growing importance of effective privacy and information management practices and controls has been demonstrated by the pace and size of recent regulatory enforcement. Further, as we continue to partner with third party service providers and adopt new technologies and business models (e.g., cloud computing), our potential exposure to these risks increases. For details on how we are managing these risks, refer to the Operational risk section.
Geopolitical Uncertainty	Persisting trade tensions, policy changes, and uncertainties pertaining to Brexit and the political direction of the U.S., U.K. and Europe, have continued to impact global economic growth prospects and market sentiment. The Canadian economy is vulnerable to continued trade tensions given the country's trading relationships with the U.S. and China. Tensions also remain elevated between China and the U.S. as they continue to negotiate a trade deal. In addition, the changing political landscape in Hong Kong and ongoing tensions in the Middle East add further to global and economic uncertainty.
Canadian Housing and Household Indebtedness	The Government of Canada, and a number of provincial governments, have introduced measures to respond to concerns related to housing affordability in certain markets and elevated levels of Canadian household debt. Lower mortgage rates, along with a solid labour market and strong population growth, helped spark a recovery in the Canadian housing market in 2019. The turnaround, however, has been slower in Western Canada due to the presence of additional cooling measures in British Columbia, coupled with more modest economic growth in Alberta and Saskatchewan. Low interest rates should help ease upward pressures on household debt service ratios but should interest rates begin to rise, this could have materially negative credit implications for our broader consumer lending activities.
Regulatory Changes	We operate in multiple jurisdictions, and the continued introduction of new or revised regulations leads to increasing focus across the organization on meeting higher regulatory requirements across a number of different markets. Financial and other reforms coming into effect, across multiple jurisdictions, such as the Canadian Anti-Money Laundering regulations and Interest Rate Benchmark Reform, continue to provide challenges and impact our operations and strategies. For more details, refer to the Legal and regulatory environment risk section.

Emerging Risks	Description
Digital Disruption and Innovation	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. Established technology companies, newer competitors, and regulatory changes continue to foster new business models that could challenge traditional banks and financial products. In addition, these trends and developments are eliciting re-energized efforts from traditional competitors to meet the evolving needs of clients and compete with non-traditional competitors. Finally, the adoption of new technologies, such as AI and machine learning, presents opportunities for us, but could result in new and complex risks that would need to be managed effectively.
Climate Change	Extreme weather events and the global transition to a low carbon economy could result in a broad range of impacts, including potential strategic, reputational, structural and credit related risks for us and our clients. In addition, climate change regulations, frameworks, and guidance are rapidly emerging and evolving across the globe. Increasing regulatory expectations create a new set of compliance risks that need to be managed. For details on how we are managing these risks, refer to the Environmental and social risk discussion within the Overview of other 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;
- Shared responsibility for risk management;
- 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 risks we understand and make thoughtful and future-focused risk decisions;
- 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 responsive to the changing landscape and emerging risks. We accomplish this through an effective and evolving risk management approach. All risk-taking activities and exposures are within the Board-approved risk appetite, risk limits and corresponding capital and liquidity requirements. We 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 ensure that our Group Risk Management (GRM) function is independent from the businesses it supports.

Risk drivers

We define risk as the potential for downside volatility of earnings or an adverse effect on our resilience, due to losses or an undesirable outcome with respect to volatility of actual 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, which 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.

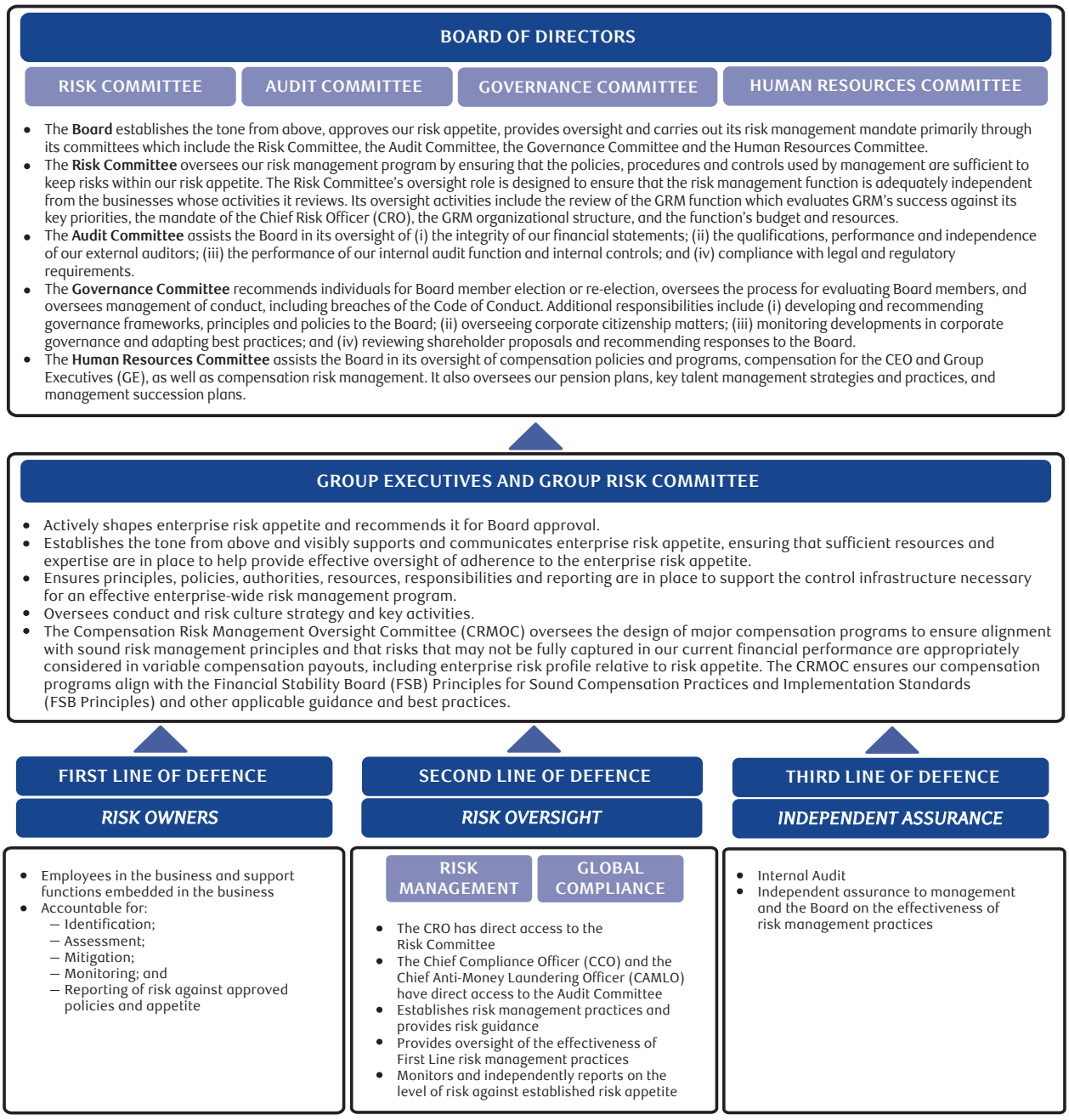
Macroeconomic	• Adverse changes in the macroeconomic environment can impact the real economy or the financial system in any of the regions in which we operate. – Examples include deterioration in the Canadian housing market, abrupt changes in the geopolitical environment, or unfavourable global trade agreements. • Resultant impacts can materialize as loss of revenue, as well as realization of credit, market or operational risk losses. • Macroeconomic risk is the least controllable type of risk arising from the business environment in which we operate. • However, we have controls in place to mitigate the impacts. These include our diversified business model and funding sources, financial crisis management strategies and protocols, stress testing programs, and product and geographic diversification.
Strategic	• Business strategy is a major driver of our risk appetite, including acquisitions and dispositions, responses to threats posed by non-traditional competitors and responses to proposed changes in the regulatory environment. • Choosing the wrong strategy, or poorly executing on the correct strategy, could have reputational risk consequences, impact our revenue mix, and/or affect our exposure to earnings volatility and loss absorption capacity. • We have a fair degree of control and influence we can exert in managing strategic and reputation risk. While the legal and regulatory environment and competitive risks are less controllable, we seek to influence them through our role as a corporate entity and as an active participant in the Canadian and global financial services industry.
Operational / Regulatory Compliance	• The complexity and scope of our operations across the globe exposes us to operational and regulatory compliance risks, which include fraud, anti-money laundering, cybersecurity and conduct risk. • We have a certain level of control over these risks through our people and systems as well as how we respond to external events.
Transactional / Positional	• Credit, market, liquidity and insurance risks are an integral part of our day-to-day business activities. • We earn revenue by taking these transactional / positional risks. • We understand these risks well and have the greatest level of control and influence over them.

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

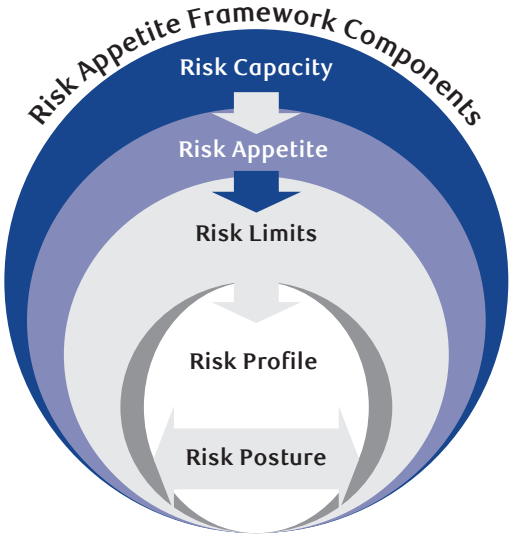
We have an effective and well-established governance framework in place to ensure that risks impacting our businesses are identified, appropriately categorized, assessed, managed and communicated to the Board in a timely manner. The risk governance framework has been established, and is maintained in alignment with, the expectations of the Office of the Superintendent of Financial Institutions (OSFI), the Basel Committee on Banking Supervision's (BCBS) corporative governance principles, and the requirements and expectations of other regulators in the jurisdictions and businesses 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 to ensure that risks are appropriately and adequately managed throughout the enterprise in order to achieve our strategic objectives.



Risk appetite

Effective risk management protects us from unacceptable losses or undesirable outcomes with respect to earnings volatility, capital adequacy or liquidity, reputational 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, and how our risk profile will be managed in relation to our risk appetite. Our risk appetite provides clear boundaries and sets an overall tone for balancing risk-reward trade-offs to ensure the long-term viability of the organization. Our Enterprise Risk Appetite Framework (ERAF) outlines the foundational aspects of our approach to risk appetite, articulates risk appetite statements and their supporting measures and associated constraints, guides design and implementation of risk appetite, and defines roles and responsibilities for its implementation and oversight. It also outlines our risk posture as the expression of the anticipated shift in risk profile as a result of changes in objectives, strategies, or external and other factors over a one year timeframe. Our risk appetite is articulated in several complimentary qualitative and quantitative risk appetite statements, which can be applied at the enterprise, business segment, business unit and legal entity levels.

Risk appetite is also integrated into our strategic, financial, and capital planning processes, as well as ongoing business decision-making processes. It is reviewed annually by senior management for recommendation to the Board for approval.



Risk Appetite Statements

Quantitative Statements

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

Qualitative Statements

- Undertake only risk we understand and make thoughtful and future-focused risk decisions.
- 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.
- 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.

Our qualitative risk appetite statements are based on our Risk Management Principles, which aim to articulate clear motivations for taking on, or avoiding, non-financial and less quantifiable risks, such as reputation and conduct risks. Our quantitative risk appetite statements are underpinned by specific quantitative risk measures.

Risk measurement

Our ability to measure risks is a key component of our enterprise-wide risk and capital management processes. Certain measurement methodologies are common to a number of risk types, while others only apply to a single risk type. While quantitative risk measurement is important, we also place reliance on qualitative factors. For those risk types that are difficult to quantify, we place greater emphasis on qualitative risk factors and assessment of activities to gauge the overall level of risk to ensure that they are within our risk appetite. In addition, we use judgment-based risk measures and various risk techniques, such as stress testing, and scenario and sensitivity analyses to assess and measure risks. Our primary methods for measuring risk include:

- Quantifying expected loss: Assesses earnings at risk and is a representation of losses that are statistically expected to occur in the normal course of business in a given time period;
- Quantifying unexpected loss: Assesses capital at risk under stressed conditions and is a statistical estimate of the amount by which actual earnings depart from the expected, over a specified time horizon;
- Stress testing: Provides a forward-looking perspective and evaluates 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: Compares the realized values to the parameter estimates that are currently used 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 target 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 targets. The results are also incorporated into our Internal Capital Adequacy Assessment Process (ICAAP) and capital plan analyses.

We annually 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. Recent scenarios evaluated include global recessions, equity market corrections, higher sovereign risks, a global trade war, increases in interest rates, real estate price corrections, and shocks to credit spreads and commodity markets.

Ongoing stress testing and scenario analyses within specific risk types, such as market risk, liquidity risk, structural interest rate 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

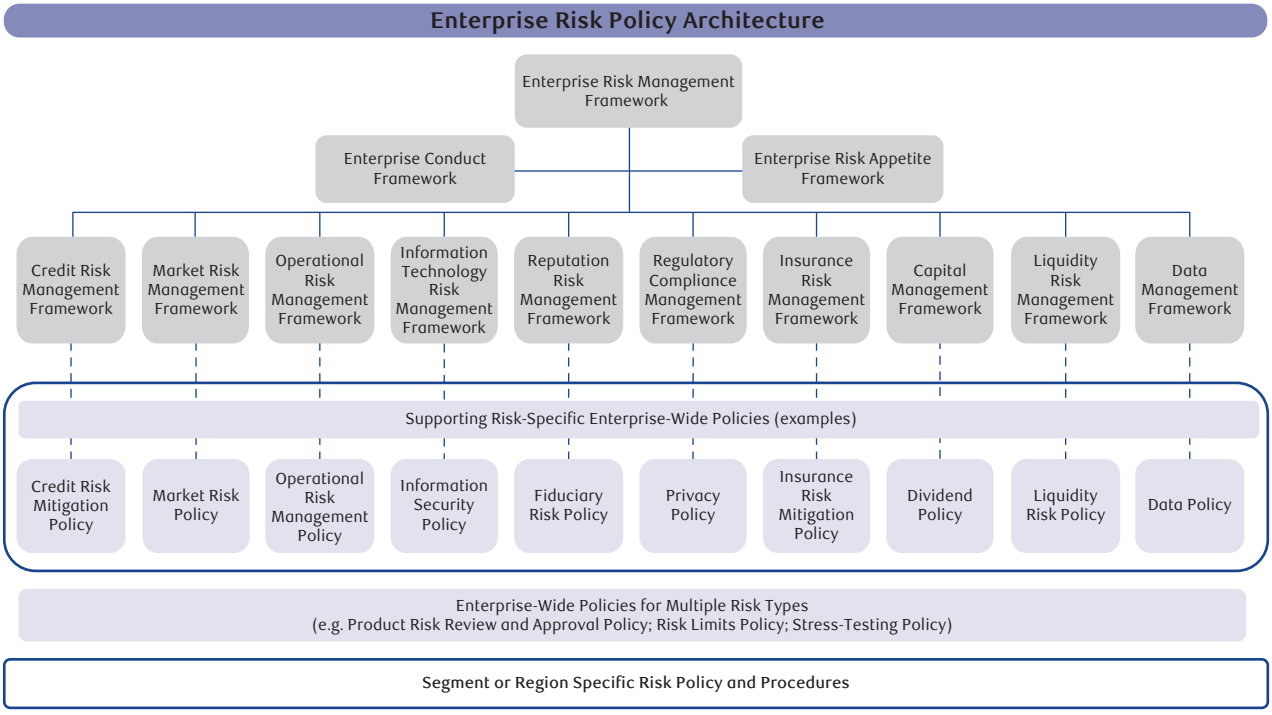
Quantitative models are used for many purposes including, but not limited to, the valuation of financial products, the identification, measurement and management of different types of risk, stress testing, assessing capital adequacy, informing business and risk decisions, measuring compliance with internal 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 models 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 are evolving our governance model to take into account the growing use of AI methods and applications in our models across our organization.

Prior to their use, models are subject to an 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 ensures 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 authorities and 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.



Risk review and approval processes

Risk review and approval processes 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 delegated authorities and risk limits based on the following categories: transactions, projects and initiatives, and new products and services.

Authorities and limits

Risk appetite is designed to account for strategic and forward-looking considerations whereas authorities and risk limits are used to govern and monitor our day-to-day business activities. Delegated authorities and limits for credit, market, liquidity and insurance risks are established by the Board and delegated to senior management at levels below risk appetite and regulatory requirements. Senior management can then 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. Transactions that exceed senior management's authorities require the approval of the Risk Committee of the Board.

Reporting

Enterprise, business segment, business unit and legal entity level risk monitoring and 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. On a quarterly basis, we provide to senior management and the Risk Committee of the Board our Enterprise Risk Report 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 providing 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.

Conduct and risk culture

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 individuals. 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, thereby allowing our good conduct to drive positive outcomes for our clients, our 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 conduct and risk culture practices align with our 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. It helps us identify and understand risks, openly discuss risks, and act on the organization's current and future risks. Our risk culture practices, which are aligned with the FSB's four fundamental risk culture practices, are:

- Tone from above;
- Accountability;
- Effective challenge; and
- Incentives and performance management.

These practices are largely grounded in our existing risk management and human resource disciplines and protocols, and, when combined with the elements of effective leadership and values, provide a base from which the resulting conduct and risk culture can be assessed, monitored, sustained and subjected to ongoing enhancement.

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 multiple online 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 makes it the 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.

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 2019 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 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 Board delegates credit risk approval authorities 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;
- 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 in order 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 high net worth individuals and small businesses. 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 and internal capital adequacy and allocation of capital to Insurance. 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 risk-weighted assets (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 updated, 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.

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 obligors 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 42**

Ratings	PD Bands		BRR	S&P	Moody's	Description
	Business and Bank	Sovereign				
1	0.0000% – 0.0300%	0.0000% – 0.0155%	1+	AAA	Aaa	Investment Grade
2	0.0000% – 0.0300%	0.0156% – 0.0265%	1H	AA+	Aa1	
3	0.0301% – 0.0375%	0.0266% – 0.0375%	1M	AA	Aa2	
4	0.0376% – 0.0490%		1L	AA-	Aa3	
5	0.0491% – 0.0650%		2+H	A+	A1	
6	0.0651% – 0.0810%		2+M	A	A2	
7	0.0811% – 0.1120%		2+L	A-	A3	
8	0.1121% – 0.1800%		2H	BBB+	Baa1	
9	0.1801% – 0.2620%		2M	BBB	Baa2	
10	0.2621% – 0.3845%		2L	BBB-	Baa3	
11	0.3846% – 0.6480%		2-H	BB+	Ba1	Non-investment Grade
12	0.6481% – 0.9625%		2-M	BB	Ba2	
13	0.9626% – 1.4070%		2-L	BB-	Ba3	
14	1.4071% – 2.1785%		3+H	B+	B1	
15	2.1786% – 3.4210%		3+M	B	B2	
16	3.4211% – 5.2775%		3+L	B-	B3	
17	5.2776% – 7.9410%		3H	CCC+	Caa1	
18	7.9411% – 11.4475%		3M	CCC	Caa2	
19	11.4476% – 19.6535%		3L	CCC-	Caa3	
20	19.6536% – 99.9990%		4	CC	Ca	
21	100%		5	C	C	Impaired
22	100%		6	D	C	

* This table represents an integral part of our 2019 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 8 of our 2019 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 (ISDA) Master Agreement and Credit Support Annex (CSA);
- 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.

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 risk levels for retail exposures:

Internal ratings map* **Table 43**

PD bands	Description
0.000% – 1.718%	Low risk
1.719% – 6.430%	Medium risk
6.431% – 99.99%	High risk
100%	Impaired/Default

* This table represents an integral part of our 2019 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, loan-to-value 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 loan-to-value 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 approved in accordance with the delegated credit risk approval authorities and are subject to our credit rules policy, which outlines the minimum standards for managing credit risk at the individual client relationship and/or transaction level.

Product approval
Proposals for credit products and services are comprehensively reviewed and approved under a risk assessment framework and are subject to 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
- Credit risk limits are set by the Board and take into account both regulatory constraints and internal risk management judgment. Limits are established at the following levels: single name limits (notional and economic capital), geographic (country and region) limits (notional and economic capital), industry sector limits (notional and economic capital), product and portfolio limits, and underwriting and distribution risk limits. These limits apply across businesses, portfolios, transactions and products.
- We 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 delinquent or defaulted borrowers. We strive to identify borrowers in financial difficulty early and modify their loan terms in order to maximize collection and to avoid foreclosure, repossession, or other legal remedies. 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, principal forgiveness and term extensions. Concessions to wholesale borrowers may include 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 customer'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 exposures at default (EAD). The classification of our sectors aligns with our view of credit risk by industry. Beginning in Q1 2019 we have prospectively implemented the standardized approach for measuring counterparty credit risk (SA-CCR) under the Capital Adequacy Requirements (CAR) guidelines, which primarily impacted on-balance sheet cash collateral and derivatives exposures.

Credit risk exposure by portfolio, sector and geography — Table 44

As at

(Millions of Canadian dollars)	October 31 2019						October 31 2018 (1)					
	Credit risk (2)			Counterparty credit risk (3)			Credit risk (2)			Counterparty credit risk (3)		
	On-balance sheet amount	Off-balance sheet amount (4) Undrawn	Off-balance sheet amount (4) Other (5)	Repo-style transactions	Derivatives	Total exposure	On-balance sheet amount	Off-balance sheet amount (4) Undrawn	Off-balance sheet amount (4) Other (5)	Repo-style transactions	Derivatives	Total exposure
Retail												
Residential secured (6)	$ 316,047	$ 64,825	$ –	$ –	$ –	$ 380,872	$ 298,555	$ 59,840	$ –	$ –	$ –	$ 358,395
Qualifying revolving (7)	26,834	73,530	–	–	–	100,364	24,223	65,617	–	–	–	89,840
Other retail	61,095	13,927	72	–	–	75,094	54,170	12,693	52	–	–	66,915
Total retail	$ 403,976	$ 152,282	$ 72	$ –	$ –	$ 556,330	$ 376,948	$ 138,150	$ 52	$ –	$ –	$ 515,150
Wholesale												
Agriculture	$ 9,084	$ 1,744	$ 46	$ –	$ 79	$ 10,953	$ 8,510	$ 1,760	$ 43	$ –	$ 45	$ 10,358
Automotive	9,710	6,990	298	–	1,217	18,215	8,936	6,435	345	–	504	16,220
Banking	45,444	1,857	615	46,601	17,908	112,425	47,868	1,734	549	52,394	26,313	128,858
Consumer discretionary	15,972	8,641	766	–	533	25,912	15,784	7,928	587	–	293	24,592
Consumer staples	5,346	8,543	518	–	1,116	15,523	4,662	6,316	517	–	672	12,167
Oil & gas	8,165	10,661	1,390	–	1,551	21,767	6,186	10,704	1,483	–	1,717	20,090
Financial services	30,194	21,023	2,749	118,239	16,688	188,893	25,798	22,345	2,164	110,246	30,580	191,133
Financing products	667	848	516	81	1,146	3,258	1,234	1,269	359	–	352	3,214
Forest products	1,468	688	97	–	27	2,280	1,140	933	89	–	23	2,185
Governments	105,011	8,120	1,432	8,228	7,214	130,005	110,192	7,566	1,798	9,476	7,182	136,214
Industrial products	7,793	8,237	565	–	644	17,239	7,751	8,219	686	–	455	17,111
Information technology	4,604	5,704	229	9	2,355	12,901	4,843	5,152	178	15	1,967	12,155
Investments	16,507	2,722	398	9	309	19,945	16,157	956	389	11	157	17,670
Mining & metals	1,698	4,209	878	–	227	7,012	1,486	3,886	917	–	184	6,473
Public works & infrastructure	1,738	1,769	397	–	192	4,096	1,899	1,836	425	–	115	4,275
Real estate & related	61,178	12,372	1,374	–	728	75,652	54,490	11,832	1,338	–	385	68,045
Other services	25,528	11,811	1,148	35	1,645	40,167	23,892	12,452	877	2	551	37,774
Telecommunication & media	4,855	9,645	109	–	1,872	16,481	7,957	12,116	134	–	1,534	21,741
Transportation	5,390	6,557	2,141	–	1,844	15,932	5,861	5,600	2,185	–	1,270	14,916
Utilities	9,189	19,233	4,266	–	3,347	36,035	9,357	19,598	3,561	–	2,581	35,097
Other sectors	1,677	382	2	8	19,904	21,973	1,931	303	1	126	11,898	14,259
Total wholesale	$ 371,218	$ 151,756	$ 19,934	$ 173,210	$ 80,546	$ 796,664	$ 365,934	$ 148,940	$ 18,625	$ 172,270	$ 88,778	$ 794,547
Total exposure (8)	$ 775,194	$ 304,038	$ 20,006	$ 173,210	$ 80,546	$ 1,352,994	$ 742,882	$ 287,090	$ 18,677	$ 172,270	$ 88,778	$ 1,309,697
By geography (9)												
Canada	$ 551,503	$ 224,258	$ 9,890	$ 65,915	$ 37,273	$ 888,839	$ 510,445	$ 205,875	$ 9,387	$ 78,172	$ 29,195	$ 833,074
U.S.	149,514	58,344	8,694	55,391	17,387	289,330	147,543	60,172	7,981	41,897	16,059	273,652
Europe	41,860	18,600	1,258	40,529	21,644	123,891	54,061	18,450	1,150	48,874	39,719	162,254
Other International	32,317	2,836	164	11,375	4,242	50,934	30,833	2,593	159	3,327	3,805	40,717
Total exposure (8)	$ 775,194	$ 304,038	$ 20,006	$ 173,210	$ 80,546	$ 1,352,994	$ 742,882	$ 287,090	$ 18,677	$ 172,270	$ 88,778	$ 1,309,697

(1) Amounts previously reflected gross credit exposures.
(2) EAD for standardized exposures are reported net of allowance for impaired assets and EAD for internal ratings based exposures are reported gross of all allowance for credit losses and partial write-offs as per regulatory definitions.
(3) 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.
(4) EAD for undrawn credit commitments and other off-balance sheet amounts are reported after the application of credit conversion factors.
(5) Includes other off-balance sheet exposures such as letters of credit and guarantees.
(6) Includes residential mortgages and home equity lines of credit.
(7) Includes credit cards, unsecured lines of credit and overdraft protection products.
(8) Excludes securitization, banking book equities and other assets not subject to the standardized or internal ratings based approach.
(9) Geographic profile is based on country of residence of the borrower.

2019 vs. 2018

Total credit risk exposure increased $43 billion or 3% from last year, primarily due to business growth in loans and acceptance exposures in our retail and wholesale portfolios, partially offset by decreases related to on-balance sheet cash collateral and derivatives due to the adoption of SA-CCR in Q1 2019.

Retail exposure increased $41 billion or 8%, largely driven by business growth.

Wholesale exposure was up $2 billion, primarily driven by business growth in loans, acceptances and increased securities, largely offset by decreases related to the adoption of SA-CCR, as noted above.

The geographic mix of our credit risk exposure changed slightly from the prior year. Our exposure in Canada, the U.S., Europe and Other International was 66%, 21%, 9%, and 4%, respectively (October 31, 2018 – 64%, 21%, 12% and 3%, respectively).

Our exposure in Canada increased $56 billion or 7% compared to the prior year, largely driven by business growth in loans and acceptances exposures, partially offset by decreases in repo-style transactions, mainly from lower volume.

Our exposure in the U.S. increased $16 billion or 6% compared to the prior year, mainly due to business growth in repo-style transactions.

Our exposure in Europe decreased $38 billion or 24% compared to the prior year, reflecting a reduction of on-balance sheet cash collateral and derivatives, both due to the adoption of SA-CCR, as noted above. Lower repo-style transactions, loans and deposits with central banks, also contributed to the decrease.

Our exposure in Other International increased $10 billion or 25% compared to the prior year, primarily due to business growth in repo-style transactions.

Net European exposure by country and client type (1), (2) — Table 45

(Millions of Canadian dollars)	As at October 31 2019								October 31 2018
	Asset type				Client type				
	Loans Outstanding	Securities (3)	Repo-style transactions	Derivatives	Financials	Sovereign	Corporate	Total	Total
U.K.	$ 8,624	$ 10,248	$ 431	$ 4,184	$ 12,700	$ 2,435	$ 8,352	$ 23,487	$ 20,078
Germany	1,388	5,421	2	416	4,392	1,005	1,830	7,227	9,417
France	956	8,001	40	214	1,904	6,499	808	9,211	10,668
Total U.K., Germany, France	$ 10,968	$ 23,670	$ 473	$ 4,814	$ 18,996	$ 9,939	$ 10,990	$ 39,925	$ 40,163
Ireland	$ 839	$ 97	$ 486	$ 45	$ 646	$ 21	$ 800	$ 1,467	$ 931
Italy	84	721	–	16	62	634	125	821	677
Portugal	–	9	58	–	59	–	8	67	33
Spain	348	111	2	59	116	5	399	520	1,443
Total peripheral	$ 1,271	$ 938	$ 546	$ 120	$ 883	$ 660	$ 1,332	$ 2,875	$ 3,084
Luxembourg (4)	$ 2,254	$ 9,096	$ 334	$ 39	$ 1,883	$ 8,492	$ 1,348	$ 11,723	$ 9,000
Netherlands (4)	1,089	778	100	283	707	2	1,541	2,250	2,815
Norway	182	2,331	10	30	2,287	47	219	2,553	1,871
Sweden	280	1,907	18	20	1,537	396	292	2,225	4,308
Switzerland	1,025	3,882	204	197	746	3,489	1,073	5,308	6,835
Other	1,971	2,233	330	284	1,567	1,302	1,949	4,818	3,795
Total other Europe	$ 6,801	$ 20,227	$ 996	$ 853	$ 8,727	$ 13,728	$ 6,422	$ 28,877	$ 28,624
Net exposure to Europe (5)	$ 19,040	$ 44,835	$ 2,015	$ 5,787	$ 28,606	$ 24,327	$ 18,744	$ 71,677	$ 71,871

(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 $120.5 billion against repo-style transactions (October 31, 2018 – $111.1 billion) and $11.4 billion against derivatives (October 31, 2018 – $11.6 billion).
(3) Securities include $9.4 billion of trading securities (October 31, 2018 – $16.2 billion), $22.5 billion of deposits (October 31, 2018 – $23.3 billion), and $12.9 billion of debt securities carried at FVOCI (October 31, 2018 – $12.5 billion).
(4) Excludes $1.5 billion (October 31, 2018 – $2.5 billion) of exposures to supranational agencies.
(5) Reflects $1.0 billion of mitigation through credit default swaps, which are largely used to hedge single name exposures and market risk (October 31, 2018 – $1.2 billion).

2019 vs. 2018

Net credit risk exposure to Europe decreased $0.2 billion from last year, mainly driven by lower trading securities, largely in Germany, mainly offset by higher loans, across a few countries, and higher derivatives.

Our European corporate loan book is managed on a global basis with underwriting standards reflecting the same approach to the use of our balance sheet as we have applied in both Canada and the U.S. PCL on loans during the year was $77 million. The gross impaired loans ratio of this loan book was 44 bps, up 34 bps from last year, mainly in the industrial products and other services sectors.

Residential mortgages and home equity lines of credit (insured vs. uninsured)
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 46**

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2019					
	Residential mortgages					Home equity lines of credit
	Insured (1)		Uninsured		Total	Total
Region (2)						
Canada						
Atlantic provinces	$ 7,715	52%	$ 7,169	48%	$ 14,884	$ 1,838
Quebec	12,385	36	22,091	64	34,476	3,512
Ontario	36,195	28	92,947	72	129,142	16,585
Alberta	20,688	53	18,143	47	38,831	6,324
Saskatchewan and Manitoba	8,951	49	9,238	51	18,189	2,363
B.C. and territories	14,711	28	37,534	72	52,245	8,267
Total Canada (3)	$ 100,645	35%	$ 187,122	65%	$ 287,767	$ 38,889
U.S. (4)	1	–	17,011	100	17,012	1,652
Other International (4)	5	–	3,307	100	3,312	1,373
Total International	$ 6	–%	$ 20,318	100%	$ 20,324	$ 3,025
Total	$ 100,651	33%	$ 207,440	67%	$ 308,091	$ 41,914

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2018					
	Residential mortgages					Home equity lines of credit
	Insured (1)		Uninsured		Total	Total
Region (2)						
Canada						
Atlantic provinces	$ 7,616	54%	$ 6,398	46%	$ 14,014	$ 1,926
Quebec	13,045	41	18,911	59	31,956	3,730
Ontario	38,708	33	77,649	67	116,357	16,811
Alberta	20,615	55	16,738	45	37,353	6,706
Saskatchewan and Manitoba	9,007	51	8,503	49	17,510	2,534
B.C. and territories	15,452	32	33,189	68	48,641	8,436
Total Canada (3)	$ 104,443	39%	$ 161,388	61%	$ 265,831	$ 40,143
U.S. (4)	1	–	13,492	100	13,493	2,099
Other International (4)	7	–	3,140	100	3,147	1,513
Total International	$ 8	–%	$ 16,632	100%	$ 16,640	$ 3,612
Total	$ 104,451	37%	$ 178,020	63%	$ 282,471	$ 43,755

(1) Insured residential mortgages are mortgages whereby our exposure to default is mitigated by insurance through the Canada Mortgage and Housing Corporation (CMHC) or other private mortgage default insurers.
(2) 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.
(3) Total consolidated residential mortgages in Canada of $288 billion (October 31, 2018 – $266 billion) is largely comprised of $263 billion (October 31, 2018 – $243 billion) of residential mortgages and $7 billion (October 31, 2018 – $7 billion) of mortgages with commercial clients, of which $4 billion (October 31, 2018 – $4 billion) are insured mortgages, both in Canadian Banking, and $18 billion (October 31, 2018 – $16 billion) of residential mortgages in Capital Markets held for securitization purposes.
(4) Home equity lines of credit include term loans collateralized by residential mortgages.

Home equity lines of credit are uninsured and reported within the personal loan category. As at October 31, 2019, home equity lines of credit in Canadian Banking were $39 billion (October 31, 2018 – $40 billion).

Residential mortgages portfolio by amortization period

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 47

	As at					
	October 31 2019			October 31 2018		
	Canada	**U.S. and other International**	**Total**	Canada	U.S. and other International	Total
Amortization period						
≤ 25 years	**72%**	**38%**	**70%**	70%	40%	68%
> 25 years ≤ 30 years	**24**	**62**	**26**	23	60	25
> 30 years ≤ 35 years	**3**	**–**	**3**	5	–	5
> 35 years	**1**	**–**	**1**	2	–	2
Total	**100%**	**100%**	**100%**	100%	100%	100%

Average loan–to–value (LTV) ratios

The following table provides a summary of our average LTV ratio for newly originated and acquired uninsured residential mortgages and Homeline products by geographic region:

Average LTV ratio — Table 48

	For the year ended			
	October 31 2019		October 31 2018	
	Uninsured		Uninsured	
	Residential mortgages (1)	**Homeline products** (2)	Residential mortgages (1)	Homeline products (2)
Region (3)				
Atlantic provinces	**74%**	**74%**	73%	74%
Quebec	**72**	**73**	72	73
Ontario	**70**	**68**	70	67
Alberta	**73**	**72**	73	71
Saskatchewan and Manitoba	**74**	**74**	74	74
B.C. and territories	**68**	**65**	67	64
U.S.	**74**	**n.m.**	71	n.m.
Other International	**71**	**n.m.**	60	n.m.
Average of newly originated and acquired for the period (4), (5)	**71%**	**69%**	70%	68%
Total Canadian Banking residential mortgages portfolio (6)	**57%**	**50%**	55%	49%

(1) Residential mortgages exclude residential mortgages within the Homeline products.
(2) Homeline products are comprised of both residential mortgages and home equity lines of credit.
(3) 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.
(4) The average LTV ratio for newly originated and acquired uninsured residential mortgages and Homeline products is calculated on a weighted basis by mortgage amounts at origination.
(5) For newly originated mortgages and Homeline products, LTV is calculated based on the total facility amount for the residential mortgage and Homeline product divided by the value of the related residential property.
(6) 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.

Provision for credit losses — Table 49

(Millions of Canadian dollars, except percentage amounts)	For the year ended October 31 2019	October 31 2018
Personal & Commercial Banking	$ 1,470	$ 1,245
Wealth Management	117	(15)
Capital Markets	304	52
Corporate Support and other	–	1
PCL – Loans	$ 1,891	$ 1,283
PCL – Other financial assets	(27)	24
Total PCL	$ 1,864	$ 1,307
PCL on loans is comprised of:		
Retail	$ 133	$ 116
Wholesale	67	7
PCL on performing loans	$ 200	$ 123
Retail	$ 1,092	$ 1,011
Wholesale	599	149
PCL on impaired loans	$ 1,691	$ 1,160
PCL – Loans	$ 1,891	$ 1,283
PCL on loans as a % of average net loans and acceptances	0.31%	0.23%
PCL on impaired loans as a % of average net loans and acceptances	0.27%	0.20%
Additional information by geography (1)		
Canada		
Residential mortgages	$ 32	$ 44
Personal	488	458
Credit cards	505	456
Small business	36	30
Retail	1,061	988
Wholesale	292	80
PCL on impaired loans	$ 1,353	$ 1,068
U.S.		
Retail	$ 12	$ 4
Wholesale	223	64
PCL on impaired loans	$ 235	$ 68
Other International		
Retail	$ 19	$ 19
Wholesale	84	5
PCL on impaired loans	$ 103	$ 24
PCL on impaired loans	$ 1,691	$ 1,160

(1) Geographic information is based on residence of the borrower.

2019 vs. 2018

Total PCL was $1,864 million. PCL on loans of $1,891 million increased $608 million, or 47% from the prior year, due to higher provisions in Capital Markets, Personal & Commercial Banking and Wealth Management. The PCL ratio on loans of 31 bps increased by 8 bps.

PCL on performing loans of $200 million increased $77 million, reflecting higher provisions in Wealth Management and Capital Markets, partially offset by lower provisions in Personal & Commercial Banking.

PCL on impaired loans of $1,691 million increased $531 million, due to higher provisions in Personal & Commercial Banking, Capital Markets and Wealth Management.

PCL on other financial assets of $(27) million, compared to $24 million in the prior year, primarily related to Personal & Commercial Banking. The prior year included provisions related to the restructuring of portfolios in Barbados, while the current year reflected recoveries, mainly due to favourable parameter updates.

PCL on loans in Personal & Commercial Banking increased $225 million, largely reflecting higher provisions on impaired loans in our Canadian Banking commercial and retail portfolios. This was partially offset by lower provisions on our performing loans, mainly due to favourable macroeconomic factors, largely offset by unfavourable changes in portfolio mix.

PCL on loans in Wealth Management increased $132 million, primarily in U.S. Wealth Management (including City National). PCL on impaired loans increased $76 million, mainly in a few sectors, including consumer discretionary and consumer staples. PCL on performing loans increased by $56 million, largely due to higher repayments and maturities in the prior year. The current year also reflected unfavourable changes in macroeconomic factors compared to last year.

PCL on loans in Capital Markets increased $252 million, largely driven by an increase in provisions on impaired loans, mainly in the oil & gas and industrial products sectors. Higher provisions on performing loans, mainly driven by unfavourable changes in macroeconomic factors compared to the prior year, also contributed to the increase.

Gross impaired loans (GIL) — **Table 50**

(Millions of Canadian dollars, except percentage amounts)	As at and for the year ended October 31 2019	October 31 2018
Personal & Commercial Banking	$ 1,712	$ 1,605
Wealth Management	266	203
Capital Markets	998	375
Corporate Support and other	–	–
Total GIL	$ 2,976	$ 2,183
Canada (1)		
Retail	$ 788	$ 723
Wholesale	678	396
GIL	1,466	1,119
U.S. (1)		
Retail	$ 36	$ 23
Wholesale	869	401
GIL	905	424
Other International (1)		
Retail	$ 272	$ 327
Wholesale	333	313
GIL	605	640
Total GIL	$ 2,976	$ 2,183
Impaired loans, beginning balance	$ 2,183	$ 2,576
Classified as impaired during the period (new impaired) (2)	3,749	2,228
Net repayments (2)	(657)	(615)
Amounts written off	(1,776)	(1,444)
Other (2), (3)	(523)	(562)
Impaired loans, balance at end of period	$ 2,976	$ 2,183
GIL as a % of related loans and acceptances		
Total GIL as a % of related loans and acceptances	0.46%	0.37%
Personal & Commercial Banking	0.37%	0.37%
Canadian Banking	0.29%	0.26%
Caribbean Banking	5.05%	6.36%
Wealth Management	0.39%	0.34%
Capital Markets	1.02%	0.41%

(1) Geographic information is based on residence of the borrower.
(2) Certain GIL movements for Canadian Banking retail and wholesale portfolios are generally allocated to new impaired, as return to performing status, Net repayments, sold, and exchange and other movements amounts are not reasonably determinable. Certain GIL movements for Caribbean Banking retail and wholesale portfolios are generally allocated to Net repayments and new impaired, as return to performing status, sold, and foreign exchange translation and other movements amounts are not reasonably determinable.
(3) Includes return to performing status during the period, recoveries of loans and advances previously written off, sold, and foreign exchange translation and other movements.

2019 vs. 2018

Total GIL of $2,976 million increased $793 million or 36% from the prior year, and the total GIL ratio of 46 bps increased 9 bps, primarily reflecting higher impaired loans in Capital Markets. Higher impaired loans in Personal & Commercial Banking and Wealth Management also contributed to the increase.

GIL in Personal & Commercial Banking increased $107 million or 7%, primarily due to higher impaired loans in our Canadian Banking commercial and retail portfolios, partially offset by lower impaired loans in our Caribbean Banking portfolios.

GIL in Wealth Management increased $63 million or 31%, primarily reflecting higher impaired loans in U.S. Wealth Management (including City National), mainly in a few sectors, including consumer discretionary and consumer staples, partially offset by repayments and write-offs.

GIL in Capital Markets increased $623 million or 166%, mainly due to new impaired loans in the oil & gas and utilities sectors, partially offset by sales and repayments.

Allowance for credit losses – Loans and acceptances **Table 51**

(Millions of Canadian dollars)	As at October 31 2019	October 31 2018
Personal & Commercial Banking	$ 2,710	$ 2,536
Wealth Management	252	202
Capital Markets	455	347
Corporate Support and other	2	3
ACL on loans	$ 3,419	$ 3,088
ACL on other financial assets	45	71
Total ACL	$ 3,464	$ 3,159
ACL on loans is comprised of:		
Retail	$ 1,886	$ 1,753
Wholesale	701	635
ACL on performing loans	$ 2,587	$ 2,388
ACL on impaired loans	$ 832	$ 700
Additional information by geography (1)		
Canada		
Retail	$ 187	$ 168
Wholesale	172	92
ACL on impaired loans	$ 359	$ 260
U.S.		
Retail	$ 1	$ 1
Wholesale	141	164
ACL on impaired loans	$ 142	$ 165
Other International		
Retail	$ 156	$ 166
Wholesale	175	109
ACL on impaired loans	$ 331	$ 275
ACL on impaired loans	$ 832	$ 700

(1) Geographic information is based on residence of the borrower.

2019 vs. 2018

Total ACL of $3,464 million increased $305 million or 10% from the prior year, largely reflecting an increase of $331 million in ACL on loans.

ACL on performing loans of $2,587 million increased $199 million from the prior year, reflecting higher ACL in Personal & Commercial Banking, Capital Markets and Wealth Management, mainly driven by volume growth and unfavourable changes in portfolio mix.

ACL on impaired loans of $832 million increased $132 million from the prior year, mainly due to higher provisions, partially offset by write-offs, in Capital Markets and Personal & Commercial Banking.

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 fair value through profit and loss (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 Other comprehensive income (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 consistent with Board requirements. The Market and Trading 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 and Stressed Value-at-Risk 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 historical one-year period of extreme volatility and its inverse rather than the most recent two-year history. The stress period used is the interval from September 2008 through August 2009. 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 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.

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 equity market crash of 1987 and the global financial crisis of 2008. 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

VaR and SVaR

The following table presents our Market risk VaR and Market risk SVaR figures for 2019 and 2018.

Market risk VaR* — Table 52

(Millions of Canadian dollars)	October 31, 2019				October 31, 2018			
		For the year ended				For the year ended		
	As at	Average	High	Low	As at	Average	High	Low
Equity	$ 22	$ 19	$ 32	$ 11	$ 34	$ 14	$ 40	$ 6
Foreign exchange	3	4	13	2	12	4	12	2
Commodities	2	2	4	1	2	2	3	1
Interest rate (1)	13	14	19	11	15	17	30	10
Credit specific (2)	5	5	6	4	5	5	6	4
Diversification (3)	(17)	(17)	n.m	n.m.	(29)	(17)	n.m.	n.m.
Market risk VaR	$ 28	$ 27	$ 45	$ 15	$ 39	$ 25	$ 44	$ 13
Market risk Stressed VaR	$ 85	$ 106	$ 161	$ 76	$ 91	$ 79	$ 149	$ 40

* This table represents an integral part of our 2019 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 portfolio diversification.
n.m. not meaningful

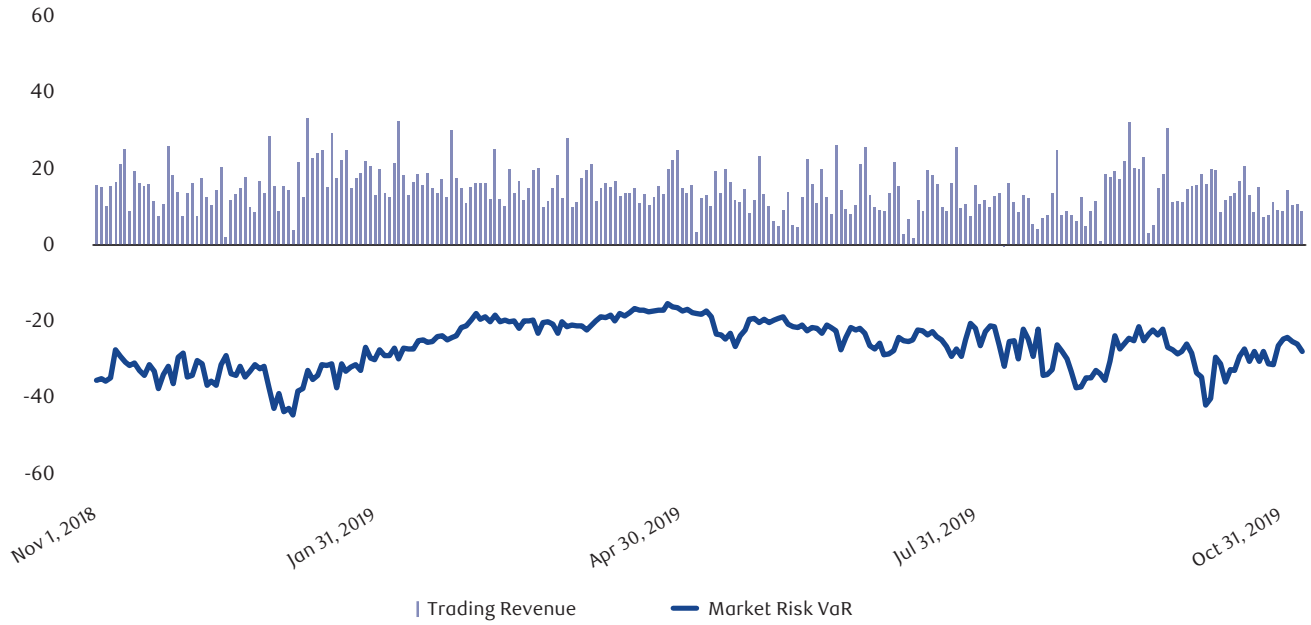
2019 vs. 2018

Average market risk VaR of $27 million increased $2 million from the prior year, mainly reflecting the impact of heightened equity market volatility from the first and fourth quarter of fiscal 2019, balanced out by lower average inventory levels in our fixed income portfolio.

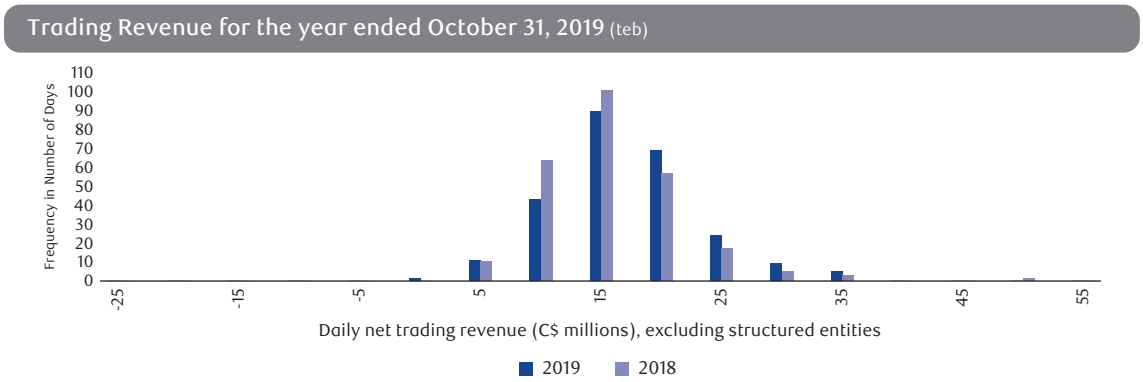
Average SVaR of $106 million increased $27 million from the prior year, largely due to growth in certain fixed income portfolios sustained since the first quarter of fiscal 2019, in addition to the impact from heightened equity market volatility mentioned above.

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 had 1 day of losses totaling $0.4 million in 2019, which did not exceed VaR on that day.

Trading revenue and VaR (Millions of Canadian dollars)



The following chart displays the distribution of daily trading profit and loss in 2019 and 2018 with 1 day of losses in 2019 of $0.4 million as mentioned above. The largest reported profit was $33 million with an average daily profit of $14 million.



Market risk measures for assets and liabilities of RBC Insurance

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 Insurance policyholder benefits, claims and acquisition expense. As at October 31, 2019, we held assets in support of $11.4 billion liabilities with respect to insurance obligations (October 31, 2018 – $10.0 billion).

Market risk controls – Structural Interest Rate Risk (SIRR) positions[1]

The interest rate risk arising from traditional banking products, such as deposits and loans, is referred to as SIRR and is subject to limits and controls. SIRR measures also include related hedges as well as the interest rate risk from securities held for liquidity management. Factors contributing to SIRR include the mismatch between asset and liability repricing dates, relative changes in asset and liability rates, and other product features that could affect the expected timing of cash flows, such as options to pre-pay loans or redeem term deposits prior to contractual maturity.

The Board approves the risk appetite for SIRR, and the Asset-Liability Committee (ALCO), along with GRM, provides ongoing governance of SIRR measurement and management through risk policies, limits, operating standards and other controls. SIRR reports are reviewed regularly by GRM, ALCO, the GRC, the Risk Committee of the Board and the Board.

Details on the non-trading risks included in SIRR are outlined in Table 54.

SIRR measurement

To monitor and control SIRR, 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 and interest rate volatility shocks.

In measuring NII risk, detailed structural balance sheets and income statements are dynamically simulated to determine 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 product maturities, renewals and growth along with prepayment and redemption behaviour. Product pricing and volumes are forecast based on past experience and expectations for a given market stress scenario. EVE risk captures the market value sensitivity of structural positions to changes in rates. In measuring EVE risk, deterministic (single-scenario) and stochastic (multiple-scenario) valuation techniques are applied to detailed 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. These SIRR measures do not include the benefit of management actions.

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 their 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 expected funding profile of mortgage rate commitments, fixed rate loan prepayment behaviour, term deposit redemption behaviour, and the treatment 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 SIRR are subject to independent oversight by GRM.

Market risk measures – Structural Interest Rate Sensitivities

The following table shows the potential before-tax impact of an immediate and sustained 100 bps and 200 bps increase or decrease in interest rates on projected 12-month NII and EVE for our structural balance sheet, assuming no subsequent hedging. Rate floors are applied within the declining rates scenarios, with floor levels set based on rate changes experienced globally. Interest rate risk measures are based upon interest rate exposures at a specific time and continuously change as a result of business activities and management actions.

[1] SIRR positions include impact of derivatives in hedge accounting relationships and FVOCI securities used for interest rate risk management.

Market risk – SIRR measures* **Table 53**

(Millions of Canadian dollars)	2019 EVE risk Canadian dollar impact	2019 EVE risk U.S. dollar impact (2)	2019 EVE risk Total	2019 NII risk (1) Canadian dollar impact	2019 NII risk (1) U.S. dollar impact (2)	2019 NII risk (1) Total	2018 EVE risk	2018 NII risk (1)
Before-tax impact of:								
100 bps increase in rates	$ (1,151)	$ (205)	$(1,356)	$ 351	$ 128	$ 479	$(1,140)	$ 505
100 bps decrease in rates	1,027	(107)	920	(486)	(151)	(637)	755	(582)
Before-tax impact of:								
200 bps increase in rates	$ (2,311)	$ (690)	$(3,001)	$ 620	$ 247	$ 867	$(2,407)	$ 923
200 bps decrease in rates	2,030	(86)	1,944	(1,071)	(285)	(1,356)	1,067	(1,370)

* This table represents an integral part of our 2019 Annual Consolidated Financial Statements.
(1) Represents the 12-month NII exposure to an instantaneous and sustained shift in interest rates.
(2) Represents the impact on the SIRR portfolios held in our City National and U.S. banking operations.

As at October 31, 2019, an immediate and sustained -100 bps shock would have had a negative impact to our NII of $637 million, up from $582 million last year. An immediate and sustained +100 bps shock at the end of October 31, 2019 would have had a negative impact to our EVE of $1,356 million, up from $1,140 million reported last year. The year-over-year change in NII sensitivity is largely attributed to balance sheet growth, while the year-over-year change in EVE sensitivity is mainly due to net growth in fixed rate assets. During 2019, NII and EVE risks remained well within approved limits.

Market risk measures for other material non-trading portfolios

Investment securities carried at FVOCI

We held $57.7 billion of investment securities carried at FVOCI as at October 31, 2019, compared to $48.5 billion in 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, 2019, our portfolio of investment securities carried at FVOCI is interest rate sensitive and would impact OCI by a pre-tax change in value of $7 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 $20 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 SIRR measure as at October 31, 2019 was $9.9 billion. Our investment securities carried at FVOCI also include equity exposures of $0.4 billion as at October 31, 2019, compared to $0.4 billion in 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 SIRR measure and other internal non-trading market risk measures. We use interest rate swaps to manage our SIRR, 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 8 of our 2019 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 54

(Millions of Canadian dollars)	As at October 31, 2019			
		Market risk measure		
	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	$ 26,310	$ –	$ 26,310	Interest rate
Interest-bearing deposits with banks	38,345	22,287	16,058	Interest rate
Securities				
Trading	146,534	136,609	9,925	Interest rate, credit spread
Investment, net of applicable allowance	102,470	–	102,470	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed	306,961	246,068	60,893	Interest rate
Loans				
Retail	426,086	10,876	415,210	Interest rate
Wholesale	195,870	7,111	188,759	Interest rate
Allowance for loan losses	(3,100)	–	(3,100)	Interest rate
Segregated fund net assets	1,663	–	1,663	Interest rate
Other				
Derivatives	101,560	99,318	2,242	Interest rate, foreign exchange
Other assets	79,802	4,648	75,154	Interest rate
Assets not subject to market risk (3)	6,434			
Total assets	$ 1,428,935	$ 526,917	$ 895,584	
Liabilities subject to market risk				
Deposits	$ 886,005	$ 99,137	$ 786,868	Interest rate
Segregated fund liabilities	1,663	–	1,663	Interest rate
Other				
Obligations related to securities sold short	35,069	35,069	–	
Obligations related to assets sold under repurchase agreements and securities loaned	226,586	218,612	7,974	Interest rate
Derivatives	98,543	96,512	2,031	Interest rate, foreign exchange
Other liabilities	79,040	8,918	70,122	Interest rate
Subordinated debentures	9,815	–	9,815	Interest rate
Liabilities not subject to market risk (4)	8,589			
Total liabilities	$ 1,345,310	$ 458,248	$ 878,473	
Total equity	$ 83,625			
Total liabilities and equity	$ 1,428,935			

(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 and SVaR and stress testing are used as risk controls for traded risk.
(2) Non-traded risk includes positions used in the management of the SIRR 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 SIRR.
(3) Assets not subject to market risk include $6,434 million of physical and other assets.
(4) Liabilities not subject to market risk include $8,589 million of payroll related and other liabilities.

(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, 2018			
Assets subject to market risk				
Cash and due from banks	$ 30,209	$ –	$ 30,209	Interest rate
Interest-bearing deposits with banks	36,471	20,277	16,194	Interest rate
Securities				
Trading	128,258	120,163	8,095	Interest rate, credit spread
Investment, net of applicable allowance	94,608	–	94,608	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed	294,602	219,108	75,494	Interest rate
Loans				
Retail	399,452	4,307	395,145	Interest rate
Wholesale	180,278	9,128	171,150	Interest rate
Allowance for loan losses	(2,912)	–	(2,912)	Interest rate
Segregated fund net assets	1,368	–	1,368	Interest rate
Derivatives	94,039	91,275	2,764	Interest rate, foreign exchange
Other assets	71,655	2,259	69,396	Interest rate
Assets not subject to market risk (3)	6,706			
Total assets	$ 1,334,734	$ 466,517	$ 861,511	
Liabilities subject to market risk				
Deposits (4)	$ 836,197	$ 81,432	$ 754,765	Interest rate
Segregated fund liabilities	1,368	–	1,368	Interest rate
Other				
Obligations related to securities sold short	32,247	32,247	–	
Obligations related to assets sold under repurchase agreements and securities loaned	206,814	201,839	4,975	Interest rate
Derivatives	90,238	87,352	2,886	Interest rate, foreign exchange
Other liabilities	72,116	7,661	64,455	Interest rate
Subordinated debentures	9,131	–	9,131	Interest rate
Liabilities not subject to market risk (4), (5)	6,668			
Total liabilities	$ 1,254,779	$ 410,531	$ 837,580	
Total equity	$ 79,955			
Total liabilities and equity	$ 1,334,734			

(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 and SVaR and stress testing are used as risk controls for traded risk.
(2) Non-traded risk includes positions used in the management of the SIRR 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 SIRR.
(3) Assets not subject to market risk include $6,706 million of physical and other assets.
(4) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in liabilities not subject to market risk. Amounts have been reclassified to conform with this presentation.
(5) Liabilities not subject to market risk include $6,668 million of 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 as they come due. 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 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 delegation of liquidity risk authorities to senior management. The Risk Committee of the Board annually approves the LRMF and the Pledging Policy and is responsible for their oversight. The Board, the Risk Committee of the Board, the GRC and the ALCO regularly review reporting on our enterprise-wide 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 annually approves the Liquidity Risk Policy (LRP), which establishes minimum risk control elements in accordance with the Board-approved risk appetite and the LRMF.

- The ALCO annually approves the Liquidity Contingency Plan (LCP) 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 an internal metric 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 enterprise-wide and unit-specific prescribed regulatory standards, such as LCR.

Contingency liquidity risk
Contingency liquidity risk planning assesses the impact of sudden stress events and our planned responses. Our LCP, 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 LCP, 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 as well as uncommitted and undrawn central bank borrowing facilities that could be accessed under extraordinary circumstances subject to satisfying certain preconditions as set by various central banks (e.g., BoC, the Fed, Bank of England, and Bank of France).

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.

Liquidity reserve **Table 55**

	As at October 31, 2019				
(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 due from banks	$ 26,310	$ –	$ 26,310	$ 2,860	$ 23,450
Interest-bearing deposits with banks	38,345	–	38,345	329	38,016
Securities issued or guaranteed by sovereigns, central banks or multilateral development banks (1)	206,960	311,019	517,979	345,753	172,226
Other securities	90,026	115,261	205,287	96,184	109,103
Undrawn credit lines granted by central banks (2)	9,534	–	9,534	–	9,534
Other assets eligible as collateral for discount (3)	109,327	–	109,327	–	109,327
Other liquid assets (4)	21,732	–	21,732	21,316	416
Total liquid assets	$ 502,234	$ 426,280	$ 928,514	$ 466,442	$ 462,072

	As at October 31, 2018				
(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 due from banks	$ 30,209	$ –	$ 30,209	$ 2,573	$ 27,636
Interest-bearing deposits with banks	36,471	–	36,471	366	36,105
Securities issued or guaranteed by sovereigns, central banks or multilateral development banks (1)	188,911	261,119	450,030	297,681	152,349
Other securities	78,090	126,209	204,299	84,589	119,710
Undrawn credit lines granted by central banks (2)	9,988	–	9,988	–	9,988
Other assets eligible as collateral for discount (3)	99,120	–	99,120	–	99,120
Other liquid assets (4)	19,758	–	19,758	19,406	352
Total liquid assets	$ 462,547	$ 387,328	$ 849,875	$ 404,615	$ 445,260

	As at	
(Millions of Canadian dollars)	**October 31 2019**	October 31 2018
Royal Bank of Canada	**$ 224,063**	$ 219,197
Foreign branches	**71,062**	73,015
Subsidiaries	**166,947**	153,048
Total unencumbered liquid assets	**$ 462,072**	$ 445,260

(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) Includes loans that qualify as eligible collateral for the discount window facility available to us at the Federal Reserve Bank of New York (FRBNY). Amounts are at face value and would be subject to collateral margin requirements applied by the FRBNY to determine collateral value/borrowing capacity. Access to the discount window borrowing program is conditional on meeting requirements set by the FRBNY and borrowings are typically expected to be infrequent and due to uncommon occurrences requiring temporary accommodation.

(3) Represents our unencumbered Canadian dollar non-mortgage loan book (at face value) that could, subject to satisfying conditions precedent to borrowing and application of prescribed collateral margin requirements, be pledged to the BoC for advances under its Emergency Lending Assistance (ELA) program. ELA is not considered a source of available liquidity in our normal liquidity risk profile but could in extraordinary circumstances, where normal market liquidity is seriously impaired, allow us and other banks to monetize assets eligible as collateral to meet requirements and mitigate further market liquidity disruption. The balance also includes our unencumbered mortgage loans that qualify as eligible collateral at Federal Home Loan Bank (FHLB).

(4) 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 adjust to the change in cash balances, and additionally from capital markets activities where business strategies and client flows may also affect the addition or subtraction of liquid assets in the overall calculation of the liquidity reserve. 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.

2019 vs. 2018
Total liquid assets increased $79 billion or 9%, primarily due to an increase in securities received as collateral under collateral swap and reverse repurchase transactions as well as the on-balance sheet securities portfolio. The increase in collateral received was offset by a corresponding increase in collateral pledged under encumbered liquid assets due to repurchase and collateral swap transactions.

Asset encumbrance
The table below provides a summary of 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, 2019, our unencumbered assets available as collateral comprised 29% of total assets (October 31, 2018 – 29%).

Asset encumbrance **Table 56**

	As at									
	October 31 2019					October 31 2018				
	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 due from banks	$ –	$ 2,860	$ 23,450	$ –	$ 26,310	$ –	$ 2,573	$ 27,636	$ –	$ 30,209
Interest-bearing deposits with banks	–	329	38,016	–	38,345	–	366	36,105	–	36,471
Securities										
Trading	44,431	–	99,420	2,683	146,534	40,640	–	84,270	3,348	128,258
Investment, net of applicable allowance	16,376	–	86,045	49	102,470	12,195	–	82,351	62	94,608
Assets purchased under reverse repurchase agreements and securities borrowed (4)	399,013	22,793	49,325	5,214	476,345	348,597	22,188	53,590	5,722	430,097
Loans										
Retail										
Mortgage securities	31,345	–	40,401	–	71,746	34,286	–	36,234	–	70,520
Mortgage loans	42,103	–	22,598	171,644	236,345	36,959	–	17,784	157,208	211,951
Non-mortgage loans	7,094	–	62,204	48,697	117,995	8,553	–	59,611	48,817	116,981
Wholesale	–	–	34,882	160,988	195,870	–	–	32,478	147,800	180,278
Allowance for loan losses	–	–	–	(3,100)	(3,100)	–	–	–	(2,912)	(2,912)
Segregated fund net assets	–	–	–	1,663	1,663	–	–	–	1,368	1,368
Other										
Derivatives	–	–	–	101,560	101,560	–	–	–	94,039	94,039
Other (5)	21,316	–	416	64,504	86,236	19,406	–	352	58,603	78,361
Total assets	$ 561,678	$ 25,982	$ 456,757	$ 553,902	$ 1,598,319	$ 500,636	$ 25,127	$ 430,411	$ 514,055	$ 1,470,229

(1) Includes assets restricted from use to generate secured funding due to legal or other constraints.
(2) Includes loans that could be used to collateralize central bank advances. Our unencumbered Canadian dollar non-mortgage loan book (at face value) could, subject to satisfying conditions for borrowing and application of prescribed collateral margin requirements, be pledged to the BoC for advances under its ELA program. It also includes our unencumbered mortgage loans that qualify as eligible collateral at FHLB. We also lodge loans that qualify as eligible collateral for the discount window facility available to us at the FRBNY. ELA and other central bank facilities are not considered sources of available liquidity in our normal liquidity risk profile. However, banks could monetize assets meeting collateral criteria during periods of extraordinary and severe disruption to market-wide liquidity.
(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 since they may not be acceptable at central banks or for other lending programs.
(4) Includes bank-owned liquid assets and securities received as collateral from off-balance sheet securities financing, derivative transactions, and margin lending. Includes $22.8 billion (October 31, 2018 – $22.2 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, 2019, relationship-based deposits, which are the primary source of funding for retail loans and mortgages, were $594 billion or 51% of our total funding (October 31, 2018 – $545 billion or 50%). 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 liquidity asset buffers.

On April 18, 2018, the Department of Finance published bail-in regulations under the Canada Deposit Insurance Corporation (CDIC) Act and the Bank Act, which became effective September 23, 2018. 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 CDIC to convert all or a portion of certain shares and liabilities of that bank into common shares. As at October 31, 2019, the notional value of issued and outstanding long-term debt subject to conversion under the Bail-in regime was $20,320 million (October 31, 2018 – $4,467 million).

For further details on our wholesale funding, refer to the Composition of wholesale funding tables below.

Long-term debt issuance

During 2019, we continued to experience more favourable unsecured wholesale funding access and pricing compared to many global peers. We issued, either directly or through our subsidiaries, unsecured long-term funding of $19.1 billion in various currencies and markets, which was more than offset by maturities.

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 mortgage-backed securities (MBS) sold, covered bonds that are collateralized with residential mortgages and securities backed by credit card receivables.

Compared to 2018, our outstanding MBS sold decreased $1.8 billion. Our covered bonds and securitized credit card receivables increased $2.3 billion and decreased $1.5 billion, respectively.

For further details, refer to the Off-balance sheet arrangements section.

Long-term funding sources* — **Table 57**

(Millions of Canadian dollars)	As at October 31 2019	As at October 31 2018
Unsecured long-term funding	**$ 94,662**	$ 102,325
Secured long-term funding	**63,853**	64,843
Subordinated debentures	**9,788**	9,397
	$ 168,303	$ 176,565

* This table represents an integral part of our 2019 Annual Consolidated Financial Statements.

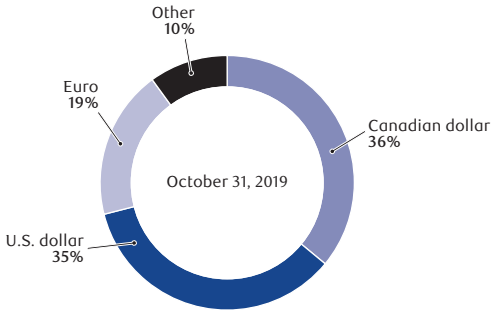
Our wholesale funding activities are well-diversified by geography, investor segment, instrument, currency, structure and maturity. We maintain an ongoing presence in different funding markets which allows us to continuously monitor market developments and trends, identify opportunities and risks, and take appropriate and timely actions. We operate longer-term debt issuance registered programs. The following table summarizes these programs with their authorized limits by geography.

Programs by geography — **Table 58**

Canada	U.S.	Europe/Asia
• Canadian Shelf Program – $25 billion	• U.S. Shelf Program – US$40 billion	• European Debt Issuance Program – US$40 billion • Global Covered Bond Program – €32 billion • Japanese Issuance Programs – ¥1 trillion

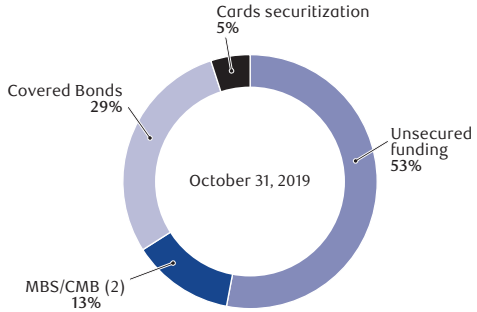
We also raise long-term funding using Canadian Senior Notes, Canadian National Housing Act MBS, Canada Mortgage Bonds, credit card receivable-backed securities, Kangaroo Bonds (issued in the Australian domestic market by foreign firms) and Yankee Certificates of Deposit (issued in the U.S. domestic market 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) Based on original term to maturity greater than 1 year

Long-term debt (1) – funding mix by product



(1) Based on 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 59**

(Millions of Canadian dollars)	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
	As at October 31, 2019							
Deposits from banks (2)	$ 4,087	$ –	$ 388	$ 33	$ 4,508	$ –	$ –	$ 4,508
Certificates of deposit and commercial paper	2,917	12,037	17,390	22,038	54,382	132	–	54,514
Asset-backed commercial paper (3)	2,542	3,188	6,543	3,905	16,178	–	–	16,178
Senior unsecured medium-term notes (4)	11	2,293	9,183	14,188	25,675	18,856	29,756	74,287
Senior unsecured structured notes (5)	847	676	171	1,342	3,036	1,810	5,047	9,893
Mortgage securitization	–	524	1,796	727	3,047	3,523	11,015	17,585
Covered bonds/asset-backed securities (6)	–	–	6,282	2,305	8,587	14,337	23,426	46,350
Subordinated liabilities	–	2,000	–	998	2,998	2,500	4,290	9,788
Other (7)	9,489	1,224	157	1,663	12,533	141	9,976	22,650
Total	$ 19,893	$ 21,942	$ 41,910	$ 47,199	$ 130,944	$ 41,299	$ 83,510	$ 255,753
Of which:								
Secured	$ 10,339	$ 3,929	$ 14,621	$ 6,937	$ 35,826	$ 17,860	$ 34,441	$ 88,127
Unsecured	9,554	18,013	27,289	40,262	95,118	23,439	49,069	167,626

(Millions of Canadian dollars)	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
	As at October 31, 2018							
Deposits from banks (2)	$ 4,507	$ 10	$ 42	$ –	$ 4,559	$ –	$ –	$ 4,559
Certificates of deposit and commercial paper	3,658	9,000	20,994	14,926	48,578	197	132	48,907
Asset-backed commercial paper (3)	1,908	2,581	5,877	6,197	16,563	–	–	16,563
Senior unsecured medium-term notes (4)	122	6,132	7,424	8,090	21,768	23,125	33,513	78,406
Senior unsecured structured notes (5)	185	215	353	693	1,446	2,603	5,608	9,657
Mortgage securitization	–	2,473	527	1,099	4,099	3,027	12,193	19,319
Covered bonds/asset-backed securities (6)	–	21	4,641	5,409	10,071	8,581	26,861	45,513
Subordinated liabilities	–	–	–	1,103	1,103	2,993	5,301	9,397
Other (7)	7,639	1,658	419	1,189	10,905	4	9,122	20,031
Total	$ 18,019	$ 22,090	$ 40,277	$ 38,706	$ 119,092	$ 40,530	$ 92,730	$ 252,352
Of which:								
Secured	$ 8,292	$ 5,666	$ 11,045	$ 12,706	$ 37,709	$ 11,608	$ 39,054	$ 88,371
Unsecured	9,727	16,424	29,232	26,000	81,383	28,922	53,676	163,981

(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 $8,014 million (October 31, 2018 – $6,978 million), bearer deposit notes (unsecured) of $4,813 million (October 31, 2018 – $4,084 million) and other long-term structured deposits (unsecured) of $9,823 million (October 31, 2018 – $8,969 million).

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[1]:

Credit ratings — **Table 60**

	As at December 3, 2019			
	Short-term debt	**Legacy senior long-term debt** (2)	**Senior long-term debt** (3)	**Outlook**
Moody's (4)	**P-1**	**Aa2**	**A2**	**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 August 1, 2019, Moody's affirmed our ratings with a stable outlook.
(5) On June 24, 2019, Standard & Poor's affirmed our ratings with a stable outlook.
(6) On October 22, 2018, Fitch Ratings affirmed our ratings with a stable outlook.
(7) On June 18, 2019, DBRS revised our outlook to stable from positive, upgraded our legacy senior long-term debt rating to AA (high) from AA and upgraded our senior long-term debt rating to AA from AA (low).

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 of positions with collateralized counterparties moving from a negative to a positive position. 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 61**

	As at					
	October 31 2019			October 31 2018		
(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	**$ 165**	**$ 64**	**$ 124**	$ 125	$ 45	$ 191
Other contractual funding or margin requirements (1)	**180**	**176**	**–**	185	176	–

(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 a 30-day period in an acute stress scenario. The BCBS and OSFI regulatory minimum coverage level for LCR is currently 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 (1) — **Table 62**

(Millions of Canadian dollars, except percentage amounts)	For the three months ended October 31 2019		July 31 2019	
	Total unweighted value (average) (2)	**Total weighted value (average)**	Total unweighted value (average) (2)	Total weighted value (average)
High-quality liquid assets				
Total high-quality liquid assets (HQLA)	**n.a.**	**$ 234,605**	n.a.	$ 224,629
Cash outflows				
Retail deposits and deposits from small business customers, of which:	**$ 266,868**	**$ 20,417**	$ 258,989	$ 19,680
Stable deposits (3)	**89,565**	**2,687**	88,841	2,665
Less stable deposits	**177,303**	**17,730**	170,148	17,015
Unsecured wholesale funding, of which:	**303,129**	**137,946**	302,672	142,038
Operational deposits (all counterparties) and deposits in networks of cooperative banks (4)	**133,484**	**31,907**	130,030	31,079
Non-operational deposits	**145,888**	**82,282**	148,207	86,524
Unsecured debt	**23,757**	**23,757**	24,435	24,435
Secured wholesale funding	**n.a.**	**33,904**	n.a.	33,351
Additional requirements, of which:	**265,287**	**72,268**	269,355	82,274
Outflows related to derivative exposures and other collateral requirements	**57,869**	**33,108**	66,828	44,430
Outflows related to loss of funding on debt products	**7,761**	**7,761**	6,080	6,080
Credit and liquidity facilities	**199,657**	**31,399**	196,447	31,764
Other contractual funding obligations (5)	**19,108**	**19,108**	20,370	20,370
Other contingent funding obligations (6)	**441,413**	**7,999**	431,682	7,842
Total cash outflows	**n.a.**	**$ 291,642**	n.a.	$ 305,555
Cash inflows				
Secured lending (e.g., reverse repos)	**$ 313,698**	**$ 52,469**	$ 327,511	$ 56,368
Inflows from fully performing exposures	**15,692**	**11,154**	14,399	9,909
Other cash inflows	**43,442**	**43,442**	55,667	55,667
Total cash inflows	**n.a.**	**$ 107,065**	n.a.	$ 121,944
		Total adjusted value		Total adjusted value
Total HQLA		**$ 234,605**		$ 224,629
Total net cash outflows		**184,577**		183,611
Liquidity coverage ratio		**127%**		122%

(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, 2019 is calculated as an average of 63 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 and medium-sized enterprises (SMEs), 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 other off-balance sheet facilities that carry low LCR runoff factors (0% – 5%).
n.a. not applicable

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 83% 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 2019 vs. Q3 2019

The average LCR for the quarter ended October 31, 2019 was 127%, which translates into a surplus of approximately $50 billion, compared to 122% in the prior quarter. The increase in the LCR surplus from the previous quarter is primarily due to a change in funding and business mix.

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 63

	As at October 31, 2019									
(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	$ 62,095	$ 3	$ –	$ –	$ –	$ –	$ –	$ –	$ 2,557	$ 64,655
Securities										
Trading (1)	96,229	14	45	10	21	64	97	8,601	41,453	146,534
Investment, net of applicable allowance	3,069	3,960	3,857	2,886	3,511	16,203	24,638	43,907	439	102,470
Assets purchased under reverse repurchase agreements and securities borrowed	164,870	62,971	41,569	10,985	14,993	133	–	–	11,440	306,961
Loans, net of applicable allowance	23,097	17,145	25,854	28,796	29,533	120,524	232,364	51,049	90,494	618,856
Other										
Customers' liability under acceptances	12,940	5,119	27	–	–	–	–	–	(24)	18,062
Derivatives	5,668	8,635	4,265	3,227	3,547	9,815	18,753	47,649	1	101,560
Other financial assets	28,296	1,400	1,193	48	61	169	277	1,861	2,164	35,469
Total financial assets	$396,264	$ 99,247	$76,810	$45,952	$51,666	$146,908	$276,129	$153,067	$148,524	$1,394,567
Other non-financial assets	2,907	1,475	108	865	109	1,373	1,507	1,696	24,328	34,368
Total assets	$399,171	$100,722	$76,918	$46,817	$51,775	$148,281	$277,636	$154,763	$172,852	$1,428,935
Liabilities and equity										
Deposits (2)										
Unsecured borrowing	$ 50,872	$ 36,251	$47,307	$38,376	$42,885	$ 28,886	$ 51,557	$ 20,230	$470,027	$ 786,391
Secured borrowing	2,588	4,874	10,679	3,596	2,395	10,351	19,535	5,755	–	59,773
Covered bonds	–	–	4,828	–	5,255	10,818	13,263	5,677	–	39,841
Other										
Acceptances	12,944	5,119	27	–	–	–	–	–	1	18,091
Obligations related to securities sold short	35,069	–	–	–	–	–	–	–	–	35,069
Obligations related to assets sold under repurchase agreements and securities loaned	192,855	14,281	13,462	6	–	4	–	–	5,978	226,586
Derivatives	6,325	7,779	4,519	3,430	3,442	9,155	17,348	46,515	30	98,543
Other financial liabilities	29,008	1,066	849	290	443	272	701	8,510	691	41,830
Subordinated debentures	–	–	–	–	–	–	316	9,499	–	9,815
Total financial liabilities	$329,661	$ 69,370	$81,671	$45,698	$54,420	$ 59,486	$102,720	$ 96,186	$476,727	$1,315,939
Other non-financial liabilities	1,314	5,288	276	154	142	898	903	11,179	9,217	29,371
Equity	–	–	–	–	–	–	–	–	83,625	83,625
Total liabilities and equity	$330,975	$ 74,658	$81,947	$45,852	$54,562	$ 60,384	$103,623	$107,365	$569,569	$1,428,935
Off-balance sheet items										
Financial guarantees	$ 427	$ 2,409	$ 2,088	$ 2,829	$ 2,382	$ 986	$ 5,394	$ 45	$ 48	$ 16,608
Lease commitments	69	137	204	197	198	719	1,619	3,032	–	6,175
Commitments to extend credit	2,996	6,367	8,821	10,655	11,638	41,740	150,267	27,827	3,865	264,176
Other credit-related commitments	469	934	1,615	1,863	1,365	191	634	10	92,392	99,473
Other commitments	35	–	–	–	–	–	–	–	484	519
Total off-balance sheet items	$ 3,996	$ 9,847	$12,728	$15,544	$15,583	$ 43,636	$157,914	$ 30,914	$ 96,789	$ 386,951

(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) 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.

(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
	As at October 31, 2018									
Assets										
Cash and deposits with banks	$ 64,201	$ 2	$ –	$ –	$ –	$ –	$ –	$ –	$ 2,477	$ 66,680
Securities										
Trading (1)	86,551	20	22	16	1	52	72	6,982	34,542	128,258
Investment, net of applicable allowance	3,529	6,855	1,419	2,593	2,399	12,989	25,061	39,396	367	94,608
Assets purchased under reverse repurchase agreements and securities borrowed	168,810	66,854	28,828	10,298	11,692	552	–	–	7,568	294,602
Loans, net of applicable allowance	22,534	14,967	21,079	26,753	25,271	122,687	211,768	44,191	87,568	576,818
Other										
Customers' liability under acceptances	10,774	4,788	94	1	–	5	–	–	(21)	15,641
Derivatives	6,070	10,179	4,930	4,032	3,030	11,130	18,067	36,581	20	94,039
Other financial assets	25,670	873	938	78	157	112	231	1,758	2,120	31,937
Total financial assets	$ 388,139	$ 104,538	$ 57,310	$ 43,771	$ 42,550	$ 147,527	$ 255,199	$ 128,908	$ 134,641	$ 1,302,583
Other non-financial assets	1,809	1,268	590	364	559	971	1,352	1,125	24,113	32,151
Total assets	$ 389,948	$ 105,806	$ 57,900	$ 44,135	$ 43,109	$ 148,498	$ 256,551	$ 130,033	$ 158,754	$ 1,334,734
Liabilities and equity										
Deposits (2), (3)										
Unsecured borrowing	$ 46,793	$ 33,849	$ 47,209	$ 30,511	$ 36,116	$ 34,641	$ 50,792	$ 14,844	$ 440,246	$ 735,001
Secured borrowing	2,340	6,571	9,321	5,433	4,232	7,135	23,388	5,902	–	64,322
Covered bonds	–	–	2,579	1,499	2,982	10,022	16,360	3,432	–	36,874
Other										
Acceptances	10,775	4,787	94	1	–	5	–	–	–	15,662
Obligations related to securities sold short	32,247	–	–	–	–	–	–	–	–	32,247
Obligations related to assets sold under repurchase agreements and securities loaned	146,205	44,248	9,030	91	–	–	–	–	7,240	206,814
Derivatives	5,998	8,585	4,650	4,176	3,311	9,808	17,205	36,496	9	90,238
Other financial liabilities (3)	27,414	1,003	582	233	414	154	522	7,633	733	38,688
Subordinated debentures	–	–	–	–	103	–	318	8,710	–	9,131
Total financial liabilities	$ 271,772	$ 99,043	$ 73,465	$ 41,944	$ 47,158	$ 61,765	$ 108,585	$ 77,017	$ 448,228	$ 1,228,977
Other non-financial liabilities	992	5,095	346	183	157	765	868	9,449	7,947	25,802
Equity	–	–	–	–	–	–	–	–	79,955	79,955
Total liabilities and equity	$ 272,764	$ 104,138	$ 73,811	$ 42,127	$ 47,315	$ 62,530	$ 109,453	$ 86,466	$ 536,130	$ 1,334,734
Off-balance sheet items										
Financial guarantees	$ 532	$ 2,026	$ 1,647	$ 2,696	$ 1,337	$ 1,910	$ 4,179	$ 1,125	$ 50	$ 15,502
Lease commitments	66	131	194	199	194	695	1,517	2,814	–	5,810
Commitments to extend credit	4,122	3,417	8,736	9,667	11,406	33,030	168,071	23,899	269	262,617
Other credit-related commitments	577	795	1,586	1,498	1,324	478	680	148	107,499	114,585
Other commitments	141	–	–	–	–	–	–	–	556	697
Total off-balance sheet items	$ 5,438	$ 6,369	$ 12,163	$ 14,060	$ 14,261	$ 36,113	$ 174,447	$ 27,986	$ 108,374	$ 399,211

(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) 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.

(3) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other financial liabilities. Amounts have been reclassified to conform with this presentation.

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 64

	As at October 31, 2019					
(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)	$ 406,042	$ 315,398	$ 50,218	$ 83,651	$ 30,560	$ 885,869
Other						
Acceptances	–	18,091	–	–	–	18,091
Obligations related to securities sold short	–	35,125	–	–	–	35,125
Obligations related to assets sold under repurchase agreements and securities loaned	5,977	220,592	4	–	–	226,573
Other liabilities	617	31,794	190	640	8,512	41,753
Subordinated debentures	–	–	–	316	9,499	9,815
	412,636	621,000	50,412	84,607	48,571	1,217,226
Off-balance sheet items						
Financial guarantees (2)	$ 16,608	$ –	$ –	$ –	$ –	$ 16,608
Lease commitments	–	805	719	1,619	3,032	6,175
Commitments to extend credit (2)	226,021	38,148	6	1	–	264,176
	242,629	38,953	725	1,620	3,032	286,959
Total financial liabilities and off-balance sheet items	$ 655,265	$ 659,953	$ 51,137	$ 86,227	$ 51,603	$ 1,504,185

	As at October 31, 2018					
(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), (3)	$ 382,847	$ 287,928	$ 52,108	$ 91,154	$ 24,240	$ 838,277
Other						
Acceptances	–	15,657	5	–	–	15,662
Obligations related to securities sold short	–	32,222	–	–	–	32,222
Obligations related to assets sold under repurchase agreements and securities loaned	7,240	199,574	–	–	–	206,814
Other liabilities (3)	1,753	28,568	98	383	7,700	38,502
Subordinated debentures	–	103	–	318	8,710	9,131
	391,840	564,052	52,211	91,855	40,650	1,140,608
Off-balance sheet items						
Financial guarantees (2)	$ 15,502	$ –	$ –	$ –	$ –	$ 15,502
Lease commitments	–	784	695	1,517	2,814	5,810
Commitments to extend credit (2)	224,058	38,528	2	29	–	262,617
	239,560	39,312	697	1,546	2,814	283,929
Total financial liabilities and off-balance sheet items	$ 631,400	$ 603,364	$ 52,908	$ 93,401	$ 43,464	$ 1,424,537

* This table represents an integral part of our 2019 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) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Amounts have been reclassified to conform with this presentation.

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 four insurance sub-risks are: morbidity, mortality, longevity and travel risk.

Our Insurance Risk 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.

Operational/regulatory compliance risk drivers

Operational risk

Operational risk is the risk of loss or harm resulting from people, inadequate or failed internal processes 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 censure.

Our management of operational risk follows the three lines of defence governance model, encompassing the organizational roles and responsibilities for a co-ordinated 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 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 provides credible estimation of potential risk exposure, surfaces risk vulnerabilities, and informs strategic and capital planning decisions, which ultimately ensures that the bank is sufficiently resilient to withstand operational risk losses both in normal times and under stress situations.
- Risk reporting and communication processes ensure that relevant operational risk information is made available to management in a timely manner to support risk-informed business decisions.

Conclusions from the operational risk programs enable learning based on what has happened to us, whether it could happen elsewhere in the bank, 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 proactively identify and investigate corporate insurance opportunities to mitigate and reduce potential future impacts of operational risk.

We consider the potential risks and rewards of our decisions to strike the 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.

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.

Risk	Description
Cybersecurity	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 and alerting of potentially suspicious security events and incidents. Throughout the year, investments continued to be made on the program and multiple scenarios and simulations were conducted to test our resiliency strategy.
Data management and privacy	The use and management of data and the governance over data, are becoming increasingly important as we continue to invest in digital solutions and innovation, as well as, expanding our business activities. This is also reflected through recent regulatory developments relating to privacy, such as the General Data Protection Regulation by the European Union (EU) and the California Consumer Privacy Act (CCPA). Refer to the Legal and regulatory environment risk section. The Chief Privacy Office and the Chief Data Officer partner with cross-functional teams to develop and implement enterprise-wide standards and practices that describe how data (including personal information) is used, protected, managed and governed.
Money laundering and Terrorist financing	We maintain an enterprise-wide program designed to deter, detect and report suspected money laundering and terrorist financing activities across our organization, while ensuring compliance with the laws and regulations of the various jurisdictions in which we operate. Our Global AML Compliance Group is dedicated to the continuous development and maintenance of robust policies, guidelines, training and risk-assessment tools and models to help our employees deal with ever-evolving money laundering and terrorist financing risks. The global anti-money laundering/anti-terrorist financing program is regularly evaluated 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	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.

Operational risk capital

We have been approved by OSFI to use the Advanced Measurement Approach (AMA) for operational risk capital measurement subject to the application of a Standardized Approach (TSA) floor. Currently, TSA calculates operational risk capital based on an OSFI-established percentage of 3 years' average gross income for pre-determined industry standardized business activities. AMA is determined using our internal Operational Risk Measurement System which includes internal loss experience, external loss experience, scenario analysis, and Business Environment Internal Control Factors. RBC Bank (Georgia), RBC Caribbean, and City National will continue using TSA. RBC Insurance (including insurance recoveries) is not in the scope of operational risk capital calculations. We do not account for mitigation through insurance or any other risk transfer mechanism in our AMA model.

Effective in Q1 2020, OSFI will require banks to use only TSA for operational risk capital calculations as the use of AMA will no longer be allowed. This change comes in effect pending the implementation of the new Standardized Approach (SA) for measurement of operational risk capital under the final Basel III reforms. 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 internal average historical losses and the BIC. Once implemented, SA will replace TSA.

Operational risk loss events

During 2019, we did not experience any material operational risk loss events. For further details on our contingencies, including litigation, refer to Notes 25 and 26 of our 2019 Annual Consolidated Financial Statements.

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 a large complex financial institution such as the bank, and are often the result of inadequate or failed internal processes, people or systems.

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., Europe and other jurisdictions in which

we operate. In recent years, such regulation has become increasingly extensive and complex. In addition, the enforcement of regulatory matters has intensified. Recent resolution of such matters involving other global financial institutions have involved the payment of substantial penalties, agreements with respect to future operation of their business, actions with respect to relevant personnel and guilty pleas with respect to criminal charges.

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 examinations, 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. 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. Further, there is no assurance that we always will be, or be deemed to be, in compliance with laws, regulations or regulatory policies. Accordingly, it is possible that we could receive a judicial or regulatory judgment or decision that results in 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. In addition, we are 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, prudential and other generally applicable non-financial requirements. Specific compliance policies, procedures and supporting frameworks have been developed 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 group, the GE, and the Board. The Enterprise Strategy 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 identify and mitigate strategic risk by ensuring 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 review 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) an activity of the bank, its representatives, third party service providers or clients, or ii) 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 as a financial services organization. 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, or regulatory fines and penalties. The sources of reputation risk are widespread; risk to our reputation can occur in connection with credit, regulatory, legal and operational risks. We can also experience reputation risk from a failure to maintain an effective control environment, exhibit good conduct or have strong risk 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 provide an integrated view of potential reputation issues across the organization. This governance structure ensures that ownership and accountability for reputation risk are understood across the enterprise, both proactive and reactive reputation risk decisions are escalated to a senior executive committee 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 those 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 our costs, impact our profitability and increase the complexity of our operations.

Global Uncertainty

Trade policy remains a risk to the global economic outlook. Throughout 2019, the International Monetary Fund lowered its 2019 and 2020 global growth projections due to continued geopolitical uncertainty, weaker than anticipated global trade activity and softening inflation. While Canada, the U.S. and Mexico successfully renegotiated the North American Free Trade Agreement, it remains uncertain whether the new Canada-United States-Mexico Agreement (CUSMA) will be ratified by the end of calendar 2019. The Canadian economy is vulnerable to continued trade tensions given Canada's trading relationships with both the U.S. and China. Tensions remain elevated between China and the U.S. as they continue to negotiate a trade deal. The outcome of the Brexit negotiations remains uncertain, as the EU granted the U.K. an extension until January 31, 2020 to determine the terms of its withdrawal from the EU.

Consumer Protection

The Canadian federal government has focused its attention on issues relating to consumer protection and the sales practices of banks. While the government's proposed legislative changes to consumer protection provisions applicable to banks were approved on December 13, 2018, some of the changes have not yet become effective and the government remains in the early stages of developing a regulatory framework to support the new provisions.

Privacy

In May 2019, the Canadian government released a digital charter with principles for data use and governance, along with proposed privacy law reforms that include greater individual control over data and stronger regulatory enforcement and oversight. In addition, in June 2019, the Standing Senate Committee on Banking, Trade and Commerce released its report calling for urgent legal reform to quickly advance open banking. Although timing is uncertain, significant reform is anticipated that may impact Canadian and international business processes and privacy risk management practices.

Outside of Canada, unprecedented privacy breach fines and settlements have been issued, demonstrating increasing regulatory vigilance and enforcement. The CCPA, which becomes effective on January 1, 2020, is currently the most comprehensive state privacy law in the U.S., and includes numerous new and expanded privacy requirements and obligations for companies doing business in the state, or collecting California residents' personal information. The U.S. Regional Head of Privacy is coordinating activities across our U.S. businesses, and a U.S. Information Governance and Privacy Committee was established to monitor the implementation of the CCPA and future state privacy laws as well as to oversee privacy issues. Legislative and regulatory developments are also being closely monitored since the General Data Protection Regulation became law in the EU. The Office of the Privacy Commissioner of Canada (OPC) continues to call for more modern legislation, including the ability to audit businesses and fine companies that do not adhere to privacy laws. These actions demonstrate the ongoing trend toward increased regulatory intervention in the use and safeguarding of personal information, and we are reviewing the potential implications for our various businesses. Our Global Privacy Program is responsible for ensuring our organization meets these evolving global principles.

Canadian Anti-Money Laundering (AML) regulations

In July 2019, amendments to Canada's Proceeds of Crime (Money Laundering) and Terrorist Financing Act regulations were released and will become effective by June 2021. These amendments aim to improve the effectiveness of Canada's anti-money laundering and counter-terrorism financing regime, and to improve compliance with international standards. New regulations, which represent increased oversight and regulatory monitoring, will require substantial changes to our client-facing, transaction and payment processing, and records management systems mainly due to the need for the capture of additional client data.

Canadian Housing Market and Consumer Debt

The Government of Canada and a number of provincial governments have introduced measures to respond to concerns relating to the level and sustainability of Canadian household debt. Risks in this area continue to be closely monitored with further regulatory responses possible depending on market conditions and any heightened concerns that may be raised.

Interest Rate Benchmark Reform

London Interbank Offered Rate (LIBOR) is the most widely referenced benchmark interest rate across the globe for derivatives, bonds, loans and other floating rate instruments; however, there is a regulator-led push to transition the market from LIBOR and certain other benchmark rates to alternative risk-free, or nearly risk-free, rates that are based on actual overnight transactions. However, some regulators and market participants continue to evaluate other options. In addition to the U.S. and U.K., regulators and national central banks internationally, including the BoC, have warned the market they will need to be prepared for certain benchmark rates to be discontinued at the end of 2021. Derivatives, floating rate notes and other financial contracts whose terms extend beyond 2021, and that refer to certain benchmark rates as the reference rate, will be impacted. For further details, refer to the Critical accounting policies and estimates section.

Other Regulatory Initiatives Impacting Financial Services in Canada

Several initiatives are underway or contemplated. From the perspective of the federal government this includes: a consultation process on the merits of open banking in a Canadian context; a consultation on the digital/data-driven economy; and consultations on the details of its deposit insurance review. From a provincial perspective, the Canadian Securities Administrators are engaged in a consultation process on registration and business conduct rules relating to OTC derivatives products, including bank activities in this area.

United States Tax Reform
The majority of the provisions of the U.S. Tax Cuts and Jobs Act legislation (U.S. Tax Reform), which was passed in December 2017, took effect at the beginning of calendar 2018 or for fiscal years beginning in 2018. Regulations clarifying certain aspects of the new law, however, continue to be released. In December 2018, the U.S. Treasury released proposed regulations clarifying some of the international tax provisions of the law. In December 2019, the U.S. Treasury released final regulations and additional proposed regulations clarifying many of the rules for calculating a Base Erosion Anti-Abuse Tax (BEAT). We are currently reviewing the impact of these regulations and are awaiting release of further guidance on other international tax provisions.

United States Regulatory Initiatives
Policymakers continue to evaluate and implement reforms to various U.S. financial regulations, which could result in either expansion or reduction to the U.S. regulatory requirements and associated changes in compliance costs. For example, the SEC has enacted Regulation Best Interest that establishes new standards of conduct for broker-dealers that make investment recommendations to retail customers. Broker-dealers will be required to comply starting in June 2020. Additionally, since August 2019, the financial regulatory agencies responsible for implementing the Volcker Rule have adopted amendments revising the requirements regarding proprietary trading and compliance programs, which are expected to reduce our related compliance costs. In October 2019, the Fed and the Federal Deposit Insurance Corporation (FDIC) finalized rules related to resolution plans for bank holding companies, insured depository institutions, as well as foreign banks and their intermediate holding companies. Also in October 2019, the Fed, FDIC, and the Office of the Comptroller of the Currency (OCC) finalized rules related to enhanced prudential standards, regulatory capital, and liquidity requirements for foreign banking organizations operating in the U.S. We will continue to monitor developments and any resulting implications for us.

U.K. and European Regulatory Reform
In addition to the implications from Brexit, other forthcoming regulatory initiatives include:

- Transaction reporting of securities financing transactions which is expected to take effect in the second calendar quarter of 2020, extended from its previous effective date of the first calendar quarter of 2019; and
- The EU's Central Securities Depositary Regulation rules which are intended to increase discipline in the settlement of securities transactions and is scheduled to take effect in September 2020.

For further details on regulatory capital and related requirements, refer to the Capital management section and the Capital, liquidity and other regulatory developments section.

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 as well as 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 with the likelihood of material damage to the economy, and that this will result in financial, reputation, legal or other risks for us.

Our earnings are significantly affected by the general 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. For example, an extended economic downturn may result in higher unemployment and lower family income, corporate earnings, business investment and consumer spending, and could adversely affect the demand for our loan and other products and result in higher provisions for credit losses. Given the importance of our Canadian operations, an economic downturn in Canada or in the U.S. would largely affect our personal and business lending activities in our Canadian banking businesses, including mortgages and credit cards, and could significantly impact our results of operations. The U.S. economy is vulnerable to trade tensions with China as they continue to negotiate a trade deal. The Canadian economy is vulnerable to trade tensions with, and between, the U.S. and China, given Canada's trade relationship with both nations.

Our earnings are also sensitive to changes in interest rates. While the Bank of Canada left its policy rate unchanged in 2019, market interest rates have generally declined, due in part to easing by other central banks globally. A continuing low interest rate environment in Canada, the U.S. and globally would result in net interest income being unfavourably impacted by spread compression across many of our businesses while an increase in interest rates would benefit our businesses. However, a significant increase in interest rates could also adversely impact household balance sheets. This could result in credit deterioration which might negatively impact our financial results, particularly in some of our Personal & Commercial Banking and Wealth Management businesses.

Deterioration in global capital markets could result in volatility that would impact results in Capital Markets, while in Wealth Management weaker market conditions would 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.

Systemic risk is considered to be the least controllable risk facing us. Our ability to mitigate this risk when undertaking business activities is limited, other than through collaborative mechanisms between key industry participants, and, as appropriate, the public sector, 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. We also mitigate systemic risk by establishing risk limits to ensure our portfolio is well-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.

Overview of other risks

In addition to the risks described in the Risk management section, there are other risk factors, described below, which may adversely 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 EU and monetary authorities in other jurisdictions in which we operate, as well as the fiscal policies of the governments of Canada, the U.S., 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 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 position with the Audit Committee on a regular basis and discuss our tax strategy with the Audit and Risk Committees.

Our tax strategy is designed to ensure transparency and support our business strategy, and is aligned with our corporate vision and values. We seek to maximize shareholder value by ensuring that our businesses are structured in a tax-efficient manner while considering reputational risk by being in compliance with all laws and regulations. Our framework seeks to ensure 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 on arm's length terms;
- 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.

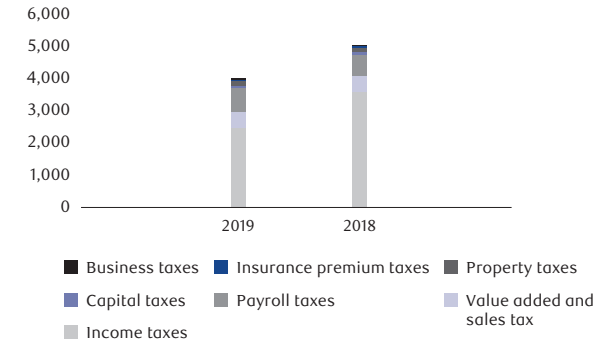
We operate in 36 countries worldwide. Our activities in these countries are subject to both Canadian and international tax legislation and other regulations, and are fully disclosed to the relevant tax authorities. The Taxation group and GRM both regularly review the activities of all entities to ensure 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 ensure 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.

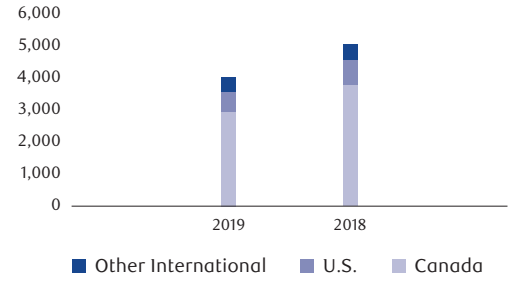
Tax contribution

In 2019, 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 $4.0 billion (2018 – $5.0 billion). In Canada, total income and other tax expense for the year ended October 31, 2019 to various levels of government totalled $2.9 billion (2018 – $3.8 billion).

Income and other tax expense – by category
(Millions of Canadian dollars)



Income and other tax expense – by geography
(Millions of Canadian dollars)



For further details on income and other tax expense, refer to the Financial performance section.

Environmental and social risk

Environmental and social (E&S) risk is the risk that an E&S issue associated with a client, transaction, product, supplier or activity will create a risk of loss of financial, operational, legal and/or reputational value to us. 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, Indigenous Peoples' rights and community engagement. GRM is responsible for developing and maintaining policies to identify, assess, monitor and report on E&S risk, and for their regular review and update. E&S risk policies seek to identify sectors, clients and business activities that may be exposed to E&S risk; apply enhanced due diligence and escalation procedures, as necessary; and establish requirements to manage, mitigate and monitor E&S risk. Business segments and corporate functions are responsible for incorporating E&S risk management requirements within their operations.

We recognize the importance of E&S risk management practices and processes and are committed to regular and transparent disclosure. As a signatory to the Equator Principles (EP), we report annually on projects assessed according to the EP framework. RBC Global Asset Management (GAM) and BlueBay Asset Management LLP are signatories to the United Nations Principles for Responsible Investment (UN PRI) and report annually on their responsible investment activities to the UN PRI. RBC Europe Limited (RBCEL), a wholly owned subsidiary of the bank, is a signatory to the Green Bond Principles and reports annually on its green bond underwriting activities. Our Corporate Citizenship team sets our corporate environmental strategy and reports annually on our performance in our Environmental, Social & Governance (ESG) Performance Report. We also publish an annual Modern Slavery Act Statement, which sets out the steps that we have taken to ensure that slavery and human trafficking are not taking place in our supply chains or our business, and disclosures that consider the recommendations of the FSB's Task Force on Climate-related Financial Disclosures (TCFD).

TCFD Disclosure

Governance

The Board and its Committees oversee senior management who is responsible for execution of the management of E&S risks and opportunities, which include climate change. The Board provides oversight of our strategic approach to climate change and our E&S risks, which includes how we manage climate-related risks and opportunities. GRM has a dedicated E&S risk team that develops approaches to identify, assess, monitor and report on climate-related risks, as appropriate. Performance goals on climate-related risks have been established at the management level.

Strategy

We recognize we have a role to play in accelerating the transition to a low-carbon economy and to mitigate the risks associated with climate change. Global practices in the identification, assessment and management of climate-related risks and opportunities are constantly evolving and we maintain our focus on supporting our clients with our financial products, services and advice as the transition will necessitate access to capital markets, bank debt and other funding solutions.

Our participation in the rapidly evolving sustainable finance and green bond market is an element to the low carbon transition. We have committed to providing $100 billion in sustainable finance to support our clients in renewable energy, clean transportation and other socially and environmentally beneficial activities. We issued our inaugural €500 million 5-year green bond which funds a portfolio of assets primarily in the categories of renewable energy and green buildings. These activities are aligned with the Green Bond Principles noted above, and the Social Bond Principals, that promote integrity in the social bond market.

Risk Management

Climate change may be a driver of other risk types including systemic, regulatory, competitive, strategic, reputation, credit, and market risk. Climate change was initially identified in 2017 as an emerging risk and, as such, our strategy and approach to managing it is reported on a regular basis to senior management and the Board.

We define climate risk as risks related to the transition to a lower-carbon economy (transition risks) and risks related to the physical impacts of climate change (physical risks). We conduct portfolio, client and scenario analyses to assess our exposure to, and the impact of, climate-related risks. We may be exposed to climate risk through emerging regulatory and legal requirements, disruptions to our operations and services, and the products and services we provide to our clients. We regularly review the risks that we face and the actions to mitigate these risks:

Emerging regulatory and legal requirements	• Climate change regulations, frameworks, and guidance that apply to banks, insurers and asset managers are rapidly evolving. The BoC and European Central Bank Financial Systems Reviews were published in May 2019 and address the financial and economic risks of climate change. While no specific requirements have been released, we will continue to monitor development. • RBCEL established a Senior Management Function responsible for the financial risk from climate change, and has developed an initial plan for meeting the Bank of England Prudential Regulation Authority's Supervisory Statement SS3/19 and Policy Statement PS11/19. • For clients in sectors categorized as medium and high environmental risk, such as those in carbon-intensive sectors, we evaluate whether clients have assessed and quantified the regulatory impacts of climate change.
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 provide products, services and advice to assist clients in responding to climate-related risks and opportunities (i.e., carbon trading services, green bond underwriting, clean technology lending and advisory services and responsible investing). • We maintain a diversified lending portfolio, which improves our resilience to geographic or sectoral downturns and minimizes concentrations of credit exposure. • Each business segment is responsible for identifying material climate-related risks and opportunities, which are integrated into risk management processes as necessary. We have conducted climate scenario analysis on parts of our portfolio to assess the impact of transition and physical risk drivers under different scenarios, including a 2°C scenario. • Our asset management businesses integrate ESG issues into their investment process when doing so may have a material impact on investment risk or return. • RBC Insurance® provides policy administration for property and casualty products sold through Aviva Canada Inc., and is therefore not directly exposed to climate-related risks associated with these products. The insurance industry as a whole has exposure to longer-term shifts in climate patterns, such as rising temperatures and hurricanes, which may indirectly impact our Insurance business results.

Metrics & Targets

We have commitments associated with financing, investments, risk management and carbon reduction in our operations, research, partnerships, and philanthropy. As a signatory to the Carbon Disclosure Project, we have publicly reported climate-related data since 2003, including multi-year data in accordance with the Greenhouse Gas (GHG) Protocol. We also receive third-party limited assurance on our energy and emissions metrics.

Other factors

Other factors that may affect our results include changes in government trade policy, changes in accounting standards and their effect on our accounting policies, estimates and judgments, currency and interest rate movements in Canada, the U.S., and other jurisdictions in which we operate or conduct business, changes to our credit ratings, the timely and successful development of new products and services, technological changes, effective design, implementation and execution of processes and their associated controls, fraud by internal and external parties, the possible impact on our business from disease or illness that affects local, national or global economies, disruptions to public infrastructure, including transportation, communication, power and water, international conflicts and other political developments including those relating to the war on terrorism, and our success in anticipating and managing the associated risks.

We caution that the foregoing discussion of risk factors, many of which are beyond our control, is not exhaustive and other factors could also affect our results.

Capital management

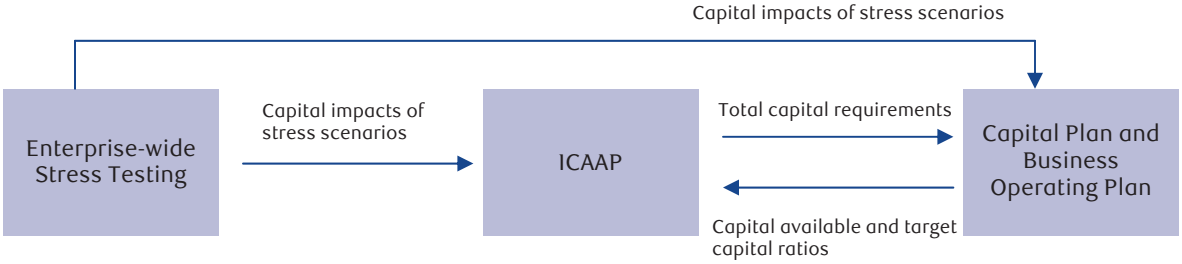
We actively manage our capital to maintain strong capital ratios and high ratings while providing strong returns to our shareholders. In addition to the regulatory requirements, we consider the expectations of credit rating agencies, depositors and shareholders, as well as our business plans, stress 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 better 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 and management of RWA and leverage ratio exposures. We manage and monitor capital from several perspectives, including regulatory capital and solo capital.

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 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 stress test results of our enterprise-wide stress testing and ICAAP processes are incorporated into the OSFI Capital Buffers, Domestic Systemically Important Bank (D-SIB)/Globally Systemically Important Bank (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 given our risk profile and appetite. In addition, we include a discretionary cushion on top of OSFI's regulatory targets to maintain 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. The Audit Committee is also responsible for the ongoing review of internal controls over capital management.

Basel III

Our consolidated regulatory capital requirements are determined by guidelines issued by OSFI, which are based on the minimum Basel III capital ratios adopted by the BCBS.

The BCBS set the Basel III transitional requirements for CET1 capital, Tier 1 capital and Total capital ratios at 6.375%, 7.875% and 9.875%, respectively for 2018, and were fully phased-in to 7.0%, 8.5% and 10.5%, respectively, effective for us in the first quarter of 2019 (including minimums plus capital conservation buffer of 2.5%). However, other than providing phase-out rules for non-qualifying capital instruments, OSFI required Canadian banks to meet the BCBS Basel III targets for CET1, Tier 1 capital and Total capital ratios in 2013. Effective the first quarter of 2016, we were required to include an additional 1% risk-weighted capital surcharge to each tier of capital for the above all-in requirements given our designation as a D-SIB by OSFI in 2013 (similar to five other Canadian banks designated as D-SIBs).

Effective January 1, 2014, OSFI allowed Canadian banks to phase in the Basel III Credit Valuation Adjustment (CVA) risk capital charge over a five-year period ending December 31, 2018. As of January 1, 2019, the CVA scalars were fully phased-in for each tier of capital, resulting in all tiers of capital having the same risk-weighted assets value. In fiscal 2018, the CVA scalars were 80%, 83% and 86% for CET1, Tier 1 and Total capital, respectively.

Under Basel III, banks select from two main approaches, the Standardized Approach 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 Standardized Approach for credit risk (for example, our Caribbean Banking operations and City National). For consolidated regulatory reporting of market risk capital, we use both Internal Models-based and Standardized Approaches. For consolidated regulatory reporting of operational risk, we currently use the higher of TSA and the AMA; however, effective in Q1 2020 we will be required to use the current TSA as the use of the AMA will no longer be allowed. We determine our regulatory leverage ratio based on OSFI's Leverage Requirements (LR) Guideline, which reflects the BCBS Basel III leverage ratio requirements. We are required to maintain a minimum leverage ratio that meets or exceeds 3%.

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 22, 2019, 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%. As the D-SIB requirement is equivalent to the G-SIB requirement of 1% of RWA, the G-SIB designation had no further impact to the loss absorbency requirements on our CET1 ratio.

On April 18, 2018, OSFI released its final guideline on Total Loss Absorbing Capacity (TLAC), which applies to Canadian D-SIBs as part of the Federal Government's Bail-in regime. The guideline is consistent with the TLAC standard released on November 9, 2015 by the FSB for institutions designated as G-SIBs, but tailored to the Canadian context. The TLAC requirement is intended to address the sufficiency of a systemically important bank'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 other 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 guideline.

TLAC requirements established two minimum standards, which are required to be met effective November 1, 2021: 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 Leverage Requirements guideline. OSFI has provided notification requiring systemically important banks to maintain a minimum TLAC ratio of 23.5%, which includes the revised DSB effective October 31, 2019 of 2.0% of RWA, as noted below, and a TLAC leverage ratio of 6.75%. We began issuing bail-in eligible debt in the fourth quarter of 2018 and this has contributed to increasing our TLAC ratio. We expect our TLAC ratio to increase through normal course refinancing of maturing unsecured term debt.

On June 20, 2018, OSFI announced that all D-SIBs are required 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 buffer will range between 0% and 2.5% of the entity's total RWA and is currently set at 2.0% of total RWA (1.5% of total RWA in 2018) for the six systemically important banks in Canada. The DSB requirements must be met at the CET1 capital level. OSFI will undertake a review of the DSB on a semi-annual basis, in June and December, and will publicly announce any changes at that time.

Effective November 1, 2018, we were required to adopt OSFI's revisions to the CAR guidelines relating to the Securitization framework and the Standardized Approach for measuring counterparty credit risk. Our adoption reflected the permissible grandfathering and transitioning of certain exposures under these frameworks. On November 1, 2019, the impact of adoption of IFRS 16, and removal of allowed grandfathering and transitioning treatment for certain securitization and counterparty credit risk exposures is expected to decrease our CET1 ratio by approximately 25-30bps.

For further details on regulatory developments during the year, refer to the Capital, liquidity and other regulatory developments section.

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 and leverage requirements imposed by OSFI:

Basel III – OSFI regulatory targets **Table 65**

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, 2019	Domestic Stability Buffer (3)	Minimum including Capital Buffers, D-SIB/G-SIB surcharge and Domestic Stability Buffer
	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%	12.1%	2.0%	10.0%
Tier 1 capital	6.0%	2.5%	8.5%	1.0%	9.5%	13.2%	2.0%	11.5%
Total capital	8.0%	2.5%	10.5%	1.0%	11.5%	15.2%	2.0%	13.5%
Leverage ratio	3.0%	n.a.	3.0%	n.a.	3.0%	4.3%	n.a.	3.0%

(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) Effective October 31, 2019, OSFI has further raised the DSB from 1.75% (in Q2 2019) to 2.0% of RWA.
n.a. not applicable.

Regulatory capital, RWA and capital ratios

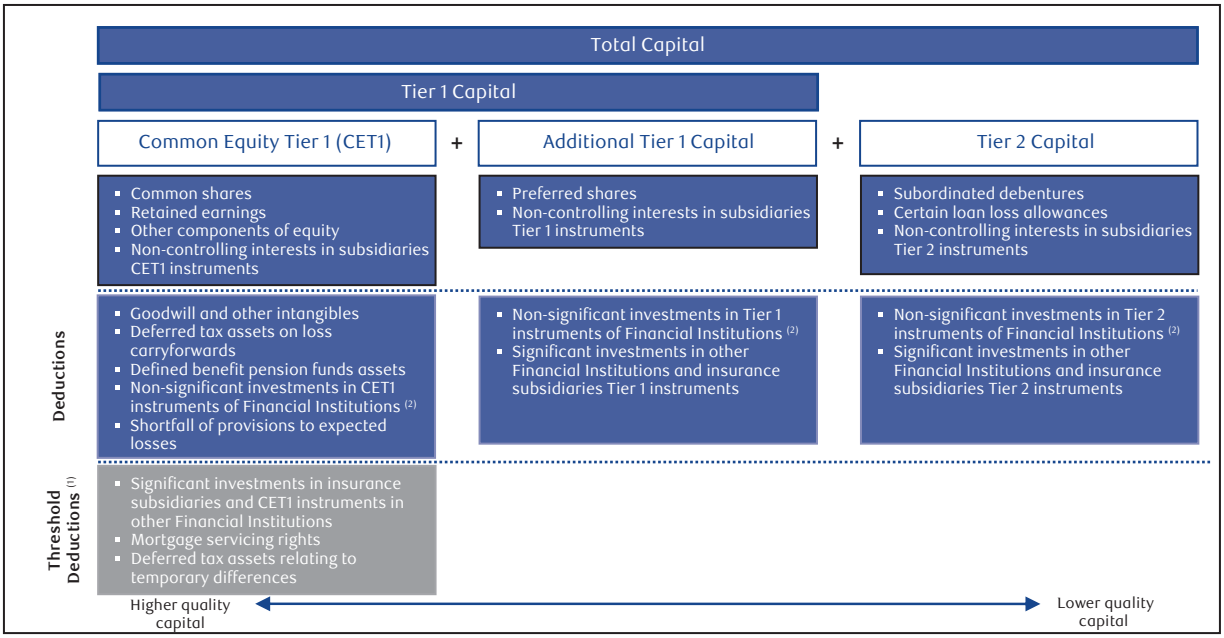
Under Basel III, regulatory capital consists of CET1, Additional Tier 1 and Tier 2 capital.

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 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 and subordinated debentures issued after January 1, 2013 require Non-viability contingent capital requirement (NVCC) features to be included into regulatory capital. NVCC requirements ensure that non-common regulatory capital instruments bear losses before banks seek government funding.

Regulatory capital ratios are calculated by dividing CET1, Tier 1 and Total capital by their respective RWA.

The following chart provides a summary of the major components of CET1, Additional Tier 1 and Tier 2 capital.



(1) 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%.

(2) 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, RWA, and capital and leverage ratios. Our capital position remains strong and our capital and leverage ratios remain well above OSFI regulatory targets:

Regulatory capital, risk-weighted assets (RWA) and capital and leverage ratios **Table 66**

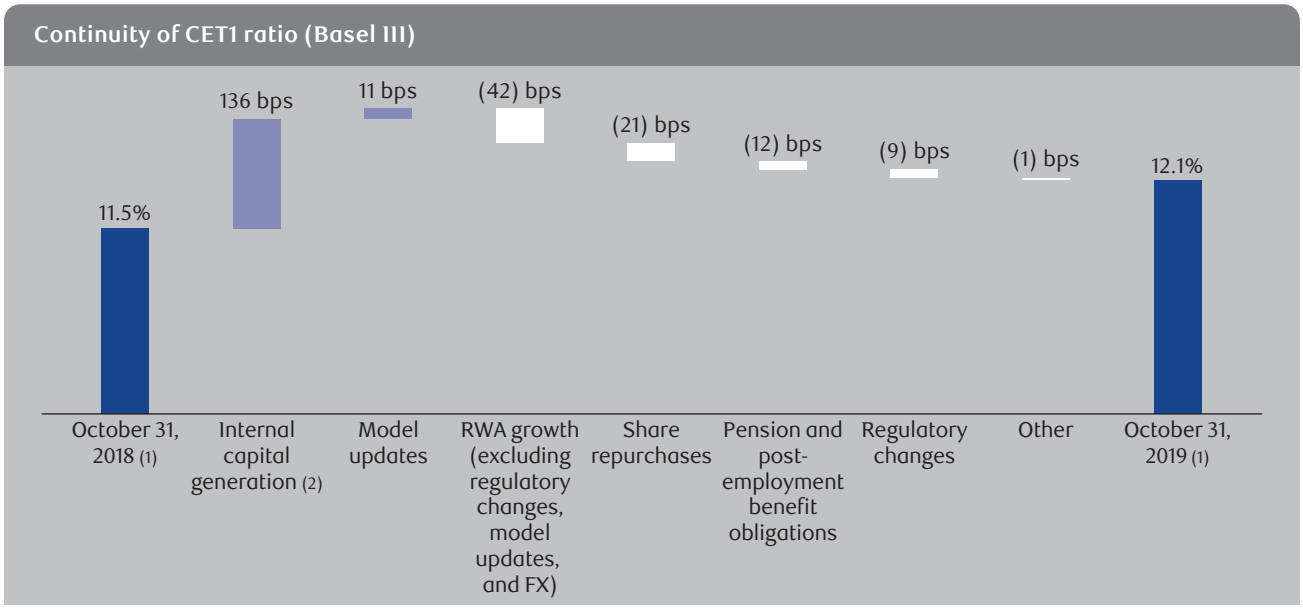
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	As at October 31 2019	October 31 2018
Capital (1)		
CET1 capital	**$ 62,184**	$ 57,001
Tier 1 capital	**67,861**	63,279
Total capital	**77,888**	72,494
Risk-weighted Assets (RWA) used in calculation of capital ratios (1), (2)		
CET1 capital RWA	**$ 512,856**	$ 495,528
Tier 1 capital RWA	**512,856**	495,993
Total capital RWA	**512,856**	496,459
Total capital RWA consisting of: (1)		
Credit risk	**$ 417,835**	$ 401,534
Market risk	**28,917**	32,209
Operational risk	**66,104**	62,716
Total capital RWA	**$ 512,856**	$ 496,459
Capital ratios and Leverage ratio (1)		
CET1 ratio	**12.1%**	11.5%
Tier 1 capital ratio	**13.2%**	12.8%
Total capital ratio	**15.2%**	14.6%
Leverage ratio	**4.3%**	4.4%
Leverage ratio exposure (billions)	**$ 1,570**	$ 1,451

(1) Capital, RWA, and capital ratios are calculated using OSFI's CAR guideline based on the Basel III framework. The Leverage ratio is calculated using OSFI Leverage Requirements Guideline based on the Basel III framework.

(2) In fiscal 2018, amounts included CVA scalars of 80%, 83% and 86%, respectively.

Regulatory Capital	Table 67	
	As at	
(Millions of Canadian dollars)	**October 31 2019**	October 31 2018
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	**$ 17,888**	$ 17,922
Retained earnings	**55,680**	50,807
Accumulated other comprehensive income (and other reserves)	**4,248**	4,823
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)	**12**	13
Regulatory adjustments applied to CET1 under Basel III	**(15,644)**	(16,564)
Common Equity Tier 1 capital (CET1)	**$ 62,184**	$ 57,001
Additional Tier 1 capital: instruments and regulatory adjustments		
Directly issued qualifying Additional Tier 1 instruments plus related stock surplus	**$ 4,175**	$ 3,825
Directly issued capital instruments to phase out from Additional Tier 1	**1,500**	2,450
Additional Tier 1 instruments issued by subsidiaries and held by third parties (amount allowed in group AT1)	**2**	3
Regulatory adjustments applied to Additional Tier 1 under Basel III	**–**	–
Additional Tier 1 capital (AT1)	**$ 5,677**	$ 6,278
Tier 1 capital (T1 = CET1 + AT1)	**$ 67,861**	$ 63,279
Tier 2 capital: instruments and provisions and regulatory adjustments		
Directly issued qualifying Tier 2 instruments plus related stock surplus	**$ 6,998**	$ 6,230
Directly issued capital instruments subject to phase out from Tier 2	**2,509**	2,509
Tier 2 instruments issued by subsidiaries and held by third parties (amount allowed in group Tier 2)	**25**	14
Collective allowance	**495**	462
Regulatory adjustments applied to Tier 2 under Basel III	**–**	–
Tier 2 capital (T2)	**$ 10,027**	$ 9,215
Total capital (T1 + T2)	**$ 77,888**	$ 72,494

2019 vs. 2018



(1) Represents rounded figures.
(2) Internal capital generation of $6.8 billion which represents Net income available to shareholders, less common and preferred shares dividends.

Our CET1 ratio was 12.1%, up 60 bps from last year, mainly reflecting internal capital generation, partially offset by higher RWA, share repurchases and the impact of lower discount rates in determining our pension and other post-employment benefit obligations.

Our Tier 1 capital ratio of 13.2% was up 40 bps, reflecting the factors noted above under the CET1 ratio. Tier 1 capital ratio was also negatively impacted by the net redemption of preferred shares.

Our Total capital ratio of 15.2% was up 60 bps, reflecting the factors noted above under the Tier 1 ratio. Total capital ratio was also favourably impacted by the net issuance of subordinated debentures.

Our Leverage ratio of 4.3% was down 10 bps, mainly reflecting higher leverage ratio exposures, share repurchases, and the net redemption of preferred shares, partially offset by internal capital generation. The increase in leverage exposures was primarily attributable to growth in retail and wholesale lending, repo-style transactions, securities and the impact of regulatory changes.

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. Effective February 1, 2018, the capital floor requirement was set to 75% 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 CAR guidelines.

Total capital risk-weighted assets — Table 68

As at October 31 (Millions of Canadian dollars, except percentage amounts)	2019 Exposure (1)	2019 Average of risk-weights (2)	2019 Risk-weighted assets: Standardized approach	2019 Risk-weighted assets: Advanced approach	2019 Risk-weighted assets: Other	2019 Risk-weighted assets: Total	2018 Total
Credit risk							
Lending-related and other							
Residential mortgages	$ 278,628	8%	$ 8,204	$ 15,425	$ –	$ 23,629	$ 21,919
Other retail	277,818	21%	6,635	52,808	–	59,443	55,669
Business	364,274	59%	46,474	168,868	–	215,342	205,735
Sovereign	143,261	7%	1,045	8,355	–	9,400	11,437
Bank	35,425	22%	1,672	5,976	–	7,648	10,239
Total lending-related and other	$ 1,099,406	29%	$ 64,030	$ 251,432	$ –	$ 315,462	$ 304,999
Trading-related							
Repo-style transactions	$ 909,124	1%	$ 109	$ 10,238	$ 122	$ 10,469	$ 8,116
Derivatives – including CVA – CET1 phase-in adjustment	90,896	37%	1,194	18,570	13,853	33,617	31,173
Total trading-related	$ 1,000,020	4%	$ 1,303	$ 28,808	$ 13,975	$ 44,086	$ 39,289
Total lending-related and other and trading-related	$ 2,099,426	17%	$ 65,333	$ 280,240	$ 13,975	$ 359,548	$ 344,288
Bank book equities	3,248	141%	–	4,583	–	4,583	4,161
Securitization exposures	64,989	12%	4,962	2,832	–	7,794	9,984
Regulatory scaling factor	n.a.	n.a.	n.a.	17,089	–	17,089	16,608
Other assets	20,155	143%	n.a.	n.a.	28,821	28,821	25,562
Total credit risk	$ 2,187,818	19%	$ 70,295	$ 304,744	$ 42,796	$ 417,835	$ 400,603
Market risk							
Interest rate			$ 2,155	$ 5,109	$ –	$ 7,264	$ 9,497
Equity			1,082	2,299	–	3,381	3,865
Foreign exchange			1,548	208	–	1,756	962
Commodities			237	59	–	296	190
Specific risk			7,144	1,741	–	8,885	8,005
Incremental risk charge			–	7,335	–	7,335	9,690
Total market risk			$ 12,166	$ 16,751	$ –	$ 28,917	$ 32,209
Operational risk			$ 5,570	$ 60,534	n.a.	$ 66,104	$ 62,716
CET1 capital risk-weighted assets (3)	$ 2,187,818		$ 88,031	$ 382,029	$ 42,796	$ 512,856	$ 495,528
Additional CVA adjustment, prescribed by OSFI, for Tier 1 capital					–	–	465
Tier 1 capital risk-weighted assets (3)	$ 2,187,818		$ 88,031	$ 382,029	$ 42,796	$ 512,856	$ 495,993
Additional CVA adjustment, prescribed by OSFI, for Total capital					–	–	466
Total capital risk-weighted assets (3)	$ 2,187,818		$ 88,031	$ 382,029	$ 42,796	$ 512,856	$ 496,459

(1) Total exposure represents exposure at default 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) In 2018, there were three different levels of RWAs for the calculation of the CET1, Tier 1 and Total capital ratios arising from the option we chose for the phase-in of the CVA capital charge. As a result, the CVA scalars of 80%, 83% and 86% were applied to CET1, Tier 1 and Total capital ratios, respectively.
n.a. not applicable.

2019 vs. 2018

During the year, CET1 RWA was up $17 billion, mainly driven by business growth in wholesale and retail lending as well as the impact of regulatory changes relating to the phase-out of CVA scalars and revisions to the CAR guidelines. These factors were partially offset by model updates relating to standardized to AIRB portfolio conversion in retail banking, derivatives parameters enhancement and market risk.

Selected capital management activity

The following table provides our selected capital management activity:

Selected capital management activity — Table 69

(Millions of Canadian dollars, except number of shares)	For the year ended October 31, 2019		
	Issuance or redemption date	Number of shares (000s)	Amount
Tier 1 capital			
Common shares activity			
Issued in connection with share-based compensation plans (1)		1,900	$ 136
Purchased for cancellation		(10,251)	(126)
Issuance of preferred shares, Series BO (2) (3)	November 2, 2018	14,000	350
Redemption of preferred shares, Series AD (2)	November 24, 2018	(10,000)	(250)
Redemption of preferred shares, Series AJ (2)	February 24, 2019	(13,579)	(339)
Redemption of preferred shares, Series AK (2)	February 24, 2019	(2,421)	(61)
Redemption of preferred shares, Series AL (2)	February 24, 2019	(12,000)	(300)
Tier 2 capital			
Issuance of July 25, 2029 subordinated debentures (3) (4)	July 25, 2019		$ 1,500
Redemption of July 17, 2024 subordinated debentures (4)	July 17, 2019		(1,000)

(1) Amounts include cash received for stock options exercised during the period and includes fair value adjustments to stock options.
(2) For further details, refer to Note 21 of our 2019 Annual Consolidated Financial Statements.
(3) Non-Viable Contingent Capital (NVCC) instruments.
(4) For further details, refer to Note 19 of our 2019 Annual Consolidated Financial Statements.

On February 23, 2018, we announced a normal course issuer bid (NCIB) to purchase up to 30 million of our common shares. This NCIB was completed on February 26, 2019, with 9.7 million common shares repurchased and cancelled at a total cost of approximately $947 million.

On February 27, 2019, we announced an NCIB to purchase up to 20 million of our common shares, commencing on March 1, 2019 and continuing until February 29, 2020, 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 6.6 million, at a cost of approximately $682 million.

In 2019, the total number of common shares repurchased and cancelled under our NCIB programs was approximately 10.3 million. The total cost of the shares repurchased was $1,030 million.

We determine the amount and timing of the 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 at the prevailing market price at the time of acquisition.

On November 2, 2018, we issued 14 million Non-Cumulative 5-Year Rate Reset Preferred Shares Series BO at a price of $25 per share.

On November 24, 2018, we redeemed all 10 million Non-Cumulative First Preferred Shares Series AD at a price of $25 per share.

On February 24, 2019, we redeemed all 2.4 million Non-Cumulative Floating Rate First Preferred Shares Series AK, all 13.6 million Non-Cumulative 5-Year Rate Reset First Preferred Shares Series AJ, and all 12 million Non-Cumulative 5-Year Rate Reset First Preferred Shares Series AL, at a price of $25 per share.

On July 17, 2019, we redeemed all $1,000 million of our outstanding NVCC 3.04% subordinated debentures due on July 17, 2024 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date.

On July 25, 2019, we issued $1,500 million of NVCC subordinated debentures. The notes bear interest at a fixed rate of 2.74% per annum until July 25, 2024, and at the three-month Canadian Dollar Offered Rate (CDOR) plus 0.98% thereafter until their maturity on July 25, 2029.

On October 18, 2019, we also announced our intention to redeem all $2,000 million of our outstanding 2.99% subordinated debentures due on December 6, 2024 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date, on December 6, 2019.

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 2019, our dividend payout ratio was 46%, which met our dividend payout ratio target of 40% to 50%. Common share dividends paid during the year were $5.8 billion.

Selected share data (1) **Table 70**

(Millions of Canadian dollars, except number of shares and as otherwise noted)	2019 Number of shares (000s)	2019 Amount	2019 Dividends declared per share	2018 Number of shares (000s)	2018 Amount	2018 Dividends declared per share
Common shares issued	**1,430,678**	**$ 17,645**	**$ 4.07**	1,439,029	$ 17,635	$ 3.77
Treasury shares – common shares	**(582)**	**(58)**		(235)	(18)	
Common shares outstanding	**1,430,096**	**$ 17,587**		1,438,794	$ 17,617	
Stock options and awards						
Outstanding	**7,697**			8,504		
Exercisable	**2,980**			3,726		
Available for grant	**8,171**			9,262		
First preferred shares issued						
Non-cumulative Series W (2)	**12,000**	**$ 300**	**$ 1.23**	12,000	$ 300	$ 1.23
Non-cumulative Series AA	**12,000**	**300**	**1.11**	12,000	300	1.11
Non-cumulative Series AC	**8,000**	**200**	**1.15**	8,000	200	1.15
Non-cumulative Series AD (3)	**–**	**–**	**–**	10,000	250	1.13
Non-cumulative Series AE	**10,000**	**250**	**1.13**	10,000	250	1.13
Non-cumulative Series AF	**8,000**	**200**	**1.11**	8,000	200	1.11
Non-cumulative Series AG	**10,000**	**250**	**1.13**	10,000	250	1.13
Non-cumulative Series AJ (4)	**–**	**–**	**0.22**	13,579	339	0.88
Non-cumulative Series AK (4)	**–**	**–**	**0.23**	2,421	61	0.78
Non-cumulative Series AL (4)	**–**	**–**	**0.27**	12,000	300	1.07
Non-cumulative Series AZ (5), (6)	**20,000**	**500**	**0.96**	20,000	500	1.00
Non-cumulative Series BB (5), (6)	**20,000**	**500**	**0.96**	20,000	500	0.98
Non-cumulative Series BD (5), (6)	**24,000**	**600**	**0.90**	24,000	600	0.90
Non-cumulative Series BF (5), (6)	**12,000**	**300**	**0.90**	12,000	300	0.90
Non-cumulative Series BH (6)	**6,000**	**150**	**1.23**	6,000	150	1.23
Non-cumulative Series BI (6)	**6,000**	**150**	**1.23**	6,000	150	1.23
Non-cumulative Series BJ (6)	**6,000**	**150**	**1.31**	6,000	150	1.31
Non-cumulative Series BK (5), (6)	**29,000**	**725**	**1.38**	29,000	725	1.38
Non-cumulative Series BM (5), (6)	**30,000**	**750**	**1.38**	30,000	750	1.38
Non-cumulative Series BO (5), (6)	**14,000**	**350**	**1.27**	–	–	–
Non-cumulative Series C-2 (7)	**20**	**31**	**US$ 67.50**	20	31	US$ 67.50
Preferred shares issued	**227,020**	**$ 5,706**		251,020	$ 6,306	
Treasury shares – preferred shares (8)	**34**	**1**		114	3	
Preferred shares outstanding	**227,054**	**$ 5,707**		251,134	$ 6,309	
Dividends						
Common		**$ 5,840**			$ 5,442	
Preferred (9)		**269**			285	

(1) For further details about our capital management activity, refer to Note 21 of our 2019 Annual Consolidated Financial Statements.
(2) Effective February 24, 2010, we have the right to convert these shares into common shares at our option, subject to certain restrictions.
(3) On November 24, 2018, we redeemed all 10 million Non-Cumulative First Preferred Shares Series AD at a price of $25 per share.
(4) On February 24, 2019, we redeemed all 2.4 million Non-Cumulative Floating Rate First Preferred Shares Series AK, all 13.6 million Non-Cumulative 5-Year Rate Reset First Preferred Shares Series AJ, and all 12 million Non-Cumulative 5-Year Rate Reset First Preferred Shares Series AL, at a price of $25 per share.
(5) Dividend rate will reset every five years.
(6) NVCC instruments.
(7) Represents 815,400 depositary shares relating to preferred shares Series C-2. Each depositary share represents one-fortieth interest in a share of Series C-2.
(8) Positive amounts represent a short position in treasury shares.
(9) Dividends on preferred shares excludes distributions to non-controlling interests.

As at November 29, 2019, the number of outstanding common shares was 1,430,517,057, net of treasury shares held of 206,508, and the number of stock options and awards was 7,654,702.

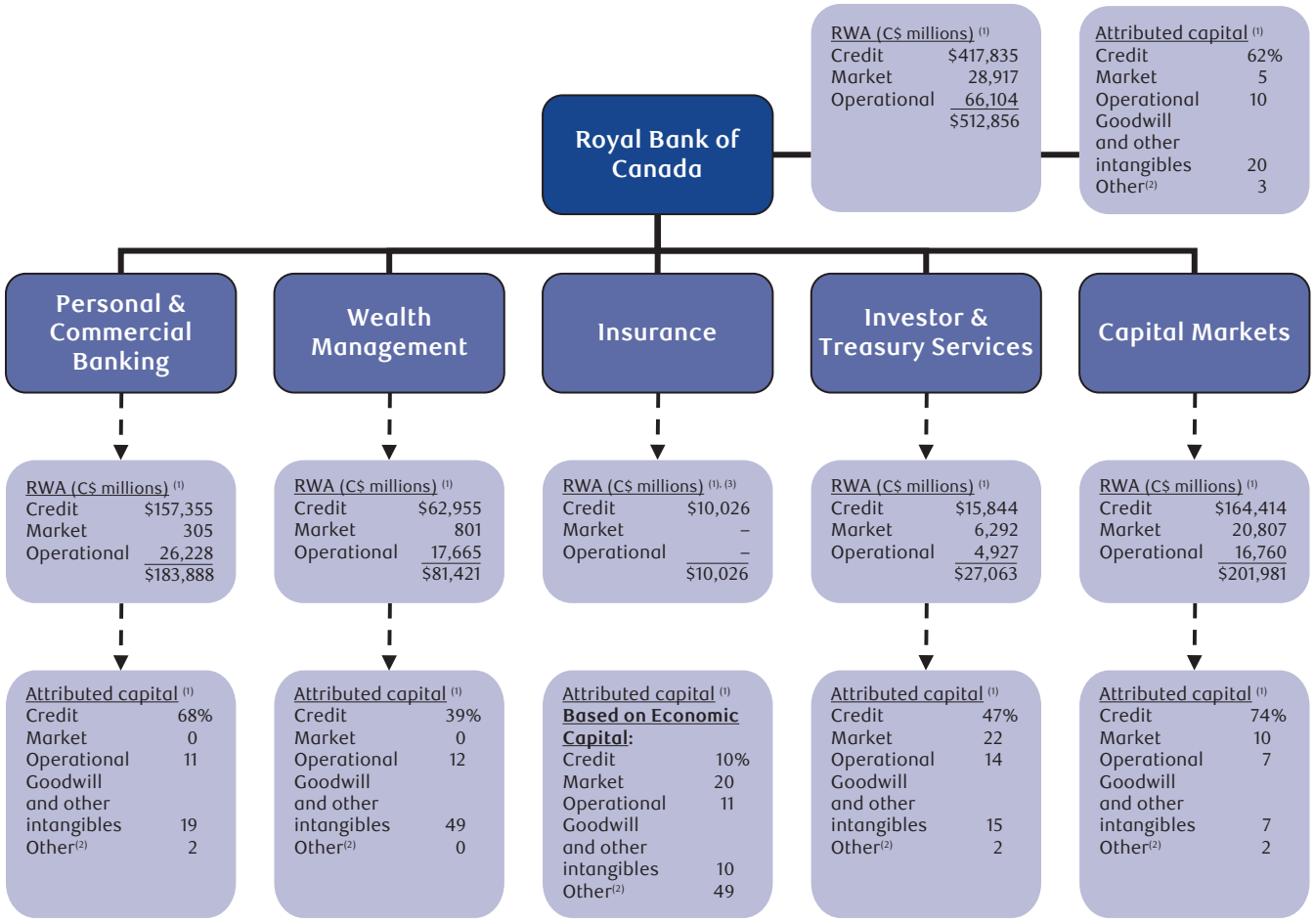
NVCC provisions require the conversion of the capital instrument into a variable number of common shares in the event that OSFI deems a bank to be non-viable or a federal or provincial government in Canada publicly announces that a bank has accepted or agreed to accept a capital injection. If a NVCC trigger event were to occur, our NVCC capital instruments, which are the preferred shares Series AZ, BB, BD, BF, BH, BI, BJ, BK, BM, BO, and subordinated debentures due on September 29, 2026, June 4, 2025, January 20, 2026, January 27, 2026 and July 25, 2029, would be converted into RBC 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 2,973 million RBC common shares, in aggregate, which would represent a dilution impact of 67.52% based on the number of RBC common shares outstanding as at October 31, 2019.

Attributed capital

Effective November 1, 2018, 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 regulator 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 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 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 internal ratings based 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.

Capital, liquidity, and other regulatory developments

Capital

Pillar 3 disclosure requirements

In December 2018, the BCBS issued its third and final phase of the Pillar 3 disclosure requirements, *Pillar 3 disclosure requirements – updated framework*. This phase incorporates revisions and additions to the Pillar 3 framework arising from the finalization of the Basel III reforms in December 2017, such as additional disclosure requirements comparing RWA as determined by banks' internal models against results based on the standardized approach, and new disclosure requirements on asset encumbrance and capital distribution constraints. The phase three requirements, together with the phase one and two disclosure requirements released in January 2015 and March 2017, respectively, complete the Pillar 3 framework. The phase one requirements were effective for us in the fourth quarter of 2018. At this time, OSFI has not yet released the implementation date for the BCBS phase two and three disclosure requirements.

Minimum Capital Requirements for Market Risk

On January 19, 2019, the BCBS released its final standards on the *Minimum capital requirement for market risk*, which replaces an earlier version published in January 2016. The revisions refined the standardized approach framework, clarified the scope of exposures subject to market risk capital requirements, revised the assessment process for evaluating the adequacy of internal risk management models, and revised the requirements for identifying risk factors eligible for internal modelling. The BCBS expects member jurisdictions to implement these revisions by 2022. We currently expect OSFI to release their draft guidelines for public consultation in 2020.

Basel III reforms

On July 18, 2019, OSFI revised its capital requirements for operational risk applicable to deposit taking institutions. Currently, we are required to apply the higher of the current Basel III Standardized Approach (TSA) and the Advanced Measurement Approach (AMA) for measuring operational risk. Effective Q1 2020, institutions will be required to use the current TSA as the use of AMA will no longer be allowed. We do not expect an impact to our capital ratios resulting from this change.

Liquidity

Liquidity Adequacy Requirements (LAR) Guidelines

On April 11, 2019, OSFI issued the final LAR guidelines for LCR, Net Cumulative Cash Flow, Net Stable Funding Ratio and liquidity monitoring tools. This concluded public consultations on guidelines affecting the liquidity reserves banks are required to hold in order to withstand stress, how banks fund their balance sheets and the monitoring of related metrics. We are well positioned to comply with the final rules, and changes are not expected to have a material impact on our ability to provide our full range of retail and wholesale financial services. The revised guideline will be effective January 1, 2020.

Net Stable Funding Ratio Disclosure

On April 11, 2019, OSFI finalized the Net Stable Funding Ratio (NSFR) Disclosure Requirements guideline. In line with the guideline, we will disclose our consolidated NSFR and its major components in a template prescribed by OSFI on a quarterly basis and it will complement the information that we already disclose about our LCR position. The new disclosure requirements are effective January 31, 2021 and we are well positioned to comply with the new requirements.

Other Regulatory Changes

Large Exposure Limits Guideline

On April 10, 2019, OSFI revised its Large Exposure Limits guideline, which is intended to constrain the maximum loss an institution could face in the event of a sudden failure of a counterparty by limiting exposures to a single counterparty or interconnected group of companies. The guideline enhances existing policies for managing the risks of large exposures and ensures consistent and robust practices across all the systemically important banks in Canada. We will be required to implement the new guideline in the first quarter of 2020 and we are well positioned to stay below the limits.

Interest rate risk management guidelines

On May 30, 2019, OSFI revised its Interest Rate Risk Management guidelines providing more comprehensive guidance on practices relating to the stress testing scenarios, risk assessment and governance, including standardized interest rate scenarios. We will be required to implement the new guidelines on January 1, 2020 and we are well positioned to comply with the new requirements.

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 2019 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, allowance for credit losses, 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, income taxes, and deferred revenue on our customer loyalty program. 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.

Changes in accounting policies

During the first quarter, we adopted IFRS 15 *Revenue from Contracts with Customers* (IFRS 15). As permitted by the transition provisions of IFRS 15, we elected not to restate comparative period results; accordingly, all comparative information is presented in accordance with our previous accounting policies, as indicated below. As a result of the adoption of IFRS 15, we reduced our opening retained earnings by $94 million[1], on an after tax basis as at November 1, 2018 (the date of initial application), to align with the recognition of certain fees with the transfer of the performance obligations.

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 probability of default 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.

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 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.

[1] Revised from the amount previously presented.

- 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 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.

For further information on allowance for credit losses, refer to Notes 2 and 5 of our 2019 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 forecast earnings 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 10 of our 2019 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 2019 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 7 of our 2019 Annual Consolidated Financial Statements.

Derecognition of financial assets

We periodically enter into transactions in which we transfer financial assets such as loans or mortgage-backed securities 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's 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 6 of our 2019 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, uncertain tax positions, 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 2019 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's judgment is applied in interpreting the relevant tax laws and 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. Where the temporary differences will not reverse in the foreseeable future, no deferred tax amount is recognized.

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 23 of our 2019 Annual Consolidated Financial Statements for further information.

Future changes in accounting policy and disclosure

IFRS 16 *Leases* (IFRS 16)

In January 2016, the IASB issued IFRS 16, which sets out the principles for the recognition, measurement, presentation and disclosure of leases. The standard removes the current requirement for lessees to classify leases as finance leases or operating leases by introducing a single accounting model that requires the recognition of right-of-use assets and lease liabilities on the balance sheet for most leases. Lessees will recognize interest expense on the lease liability and depreciation expense on the right-of-use asset in the statement of income.

IFRS 16 will be effective for us on November 1, 2019. We will adopt IFRS 16 by adjusting our Consolidated Balance Sheet as at November 1, 2019, the date of initial application, with no restatement of comparative periods. On transition to IFRS 16, we intend to apply certain practical expedients, including the following:

- Election to not separate lease and non-lease components, to be applied to our real estate leases;
- Election to measure the right-of-use asset as if IFRS 16 had been applied since the commencement date of the lease, to be applied on a lease-by-lease basis to a select number of properties; and
- Exemption from recognition for short-term and low value leases.

Based on current estimates, the adoption of IFRS 16 as at November 1, 2019 is expected to result in increases to total assets and total liabilities of approximately $5 billion, primarily representing leases of premises and equipment previously classified as operating leases, and a reduction to retained earnings of approximately $0.1 billion, net of taxes. The adoption of IFRS 16 is also expected to decrease our CET1 capital ratio by approximately 14 bps.

Interest Rate Benchmark Reform
In September 2019, the IASB issued amendments to IFRS 9 *Financial Instruments*, IAS 39 *Financial Instruments: Recognition and Measurement* and IFRS 7 *Financial Instruments: Disclosures* (Amendments) which modify certain hedge accounting requirements to provide relief from the potential effect of uncertainty caused by the Interest Rate Benchmark Reform, prior to the transition to alternative interest rates. The Amendments will be effective for us on November 1, 2020, with earlier adoption permitted.

To manage our transition to alternative interest rates, we have implemented a comprehensive enterprise-wide program and governance structure that focuses on key areas of impact including contract changes with clients, capital and liquidity planning, financial reporting and valuation, systems, processes, education and communication. The exact timing of our transition and assessment of the implications are uncertain as the interest rate replacement process differs across major jurisdictions.

We will continue to monitor regulatory guidance and expect to adjust our implementation accordingly.

Conceptual Framework for Financial Reporting (Conceptual Framework)
In March 2018, the IASB issued its revised *Conceptual Framework*. This replaces the previous version of the *Conceptual Framework* issued in 2010. The revised *Conceptual Framework* will be effective on November 1, 2020. We are currently assessing the impact of adoption on our Consolidated Financial Statements.

IFRS 17 *Insurance Contracts* (IFRS 17)
In May 2017, the IASB issued IFRS 17 to establish a comprehensive global 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. This new standard will be effective for us on November 1, 2021 and will be applied retrospectively with restatement of comparatives unless impracticable. In June 2019, the IASB issued an exposure draft to amend IFRS 17, including deferral of the effective date by one year. We will continue to monitor the IASB's developments. We are currently assessing the impact of adopting this standard and the proposed amendments 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, 2019, 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, 2019.

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, 2019 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 27 of our audited 2019 Annual Consolidated Financial Statements.

Supplementary information

Selected annual information — Table 71

(Millions of Canadian dollars, except as otherwise noted)	2019	2018	2017
Total revenue	**$ 46,002**	$ 42,576	$ 40,669
Net income attributable to:			
Shareholders	**12,860**	12,400	11,428
Non-controlling interest	**11**	31	41
	$ 12,871	$ 12,431	$ 11,469
Basic earnings per share (in dollars)	**$ 8.78**	$ 8.39	$ 7.59
Diluted earnings per share (in dollars)	**$ 8.75**	$ 8.36	$ 7.56
Dividends declared per common shares (in dollars)	**$ 4.07**	$ 3.77	$ 3.48
Total assets	**$1,428,935**	$1,334,734	$1,212,853
Deposits (1)	**$ 886,005**	$ 836,197	$ 789,036

(1) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

Net interest income on average assets and liabilities — Table 72

(Millions of Canadian dollars, except for percentage amounts) (1)	Average balances			Interest			Average rate		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Assets									
Deposits with other banks									
Canada	**$ 10,990**	$ 10,300	$ 11,380	**$ 231**	$ 198	$ 146	**2.10%**	1.92%	1.28%
U.S.	**25,392**	27,522	21,508	**505**	429	192	**1.99**	1.56	0.89
Other International	**20,463**	21,587	17,215	**(53)**	(61)	(31)	**(0.26)**	(0.28)	(0.18)
	56,845	59,409	50,103	**683**	566	307	**1.20**	0.95	0.61
Securities									
Trading	**130,647**	125,153	130,816	**4,573**	3,785	3,520	**3.50**	3.02	2.69
Investment, net of applicable allowance	**97,764**	90,470	83,787	**2,254**	1,885	1,379	**2.31**	2.08	1.65
	228,411	215,623	214,603	**6,827**	5,670	4,899	**2.99**	2.63	2.28
Asset purchased under reverse repurchase agreements and securities borrowed	**346,173**	266,709	205,993	**8,960**	5,536	3,021	**2.59**	2.08	1.47
Loans (2)									
Canada									
Retail	**379,853**	364,473	350,155	**15,352**	13,533	11,672	**4.04**	3.71	3.33
Wholesale	**89,503**	77,985	74,955	**4,988**	3,682	3,534	**5.57**	4.72	4.71
	469,356	442,458	425,110	**20,340**	17,215	15,206	**4.33**	3.89	3.58
U.S.	**96,492**	79,695	75,967	**3,099**	3,008	2,391	**3.21**	3.77	3.15
Other International	**32,430**	28,932	27,201	**1,424**	1,026	1,080	**4.39**	3.55	3.97
	598,278	551,085	528,278	**24,863**	21,249	18,677	**4.16**	3.86	3.54
Total interest-earning assets	**1,229,707**	1,092,826	998,977	**41,333**	33,021	26,904	**3.36**	3.02	2.69
Non-interest-bearing deposits with other banks	**29,430**	31,695	23,953	**–**	–	–	**–**	–	–
Customers' liability under acceptances	**17,447**	16,015	14,550	**–**	–	–	**–**	–	–
Other assets	**159,599**	154,395	149,114	**–**	–	–	**–**	–	–
Total assets	**$1,436,200**	$ 1,294,900	$ 1,186,600	**$41,333**	$ 33,021	$ 26,904	**2.88%**	2.55%	2.27%
Liabilities and shareholders' equity									
Deposits (3)									
Canada	**$ 555,467**	$ 513,240	$ 498,134	**$10,420**	$ 7,718	$ 5,560	**1.88%**	1.50%	1.12%
U.S.	**97,563**	98,651	79,354	**1,524**	1,313	640	**1.56**	1.33	0.81
Other International (4)	**83,349**	77,414	69,532	**1,044**	811	578	**1.25**	1.05	0.83
	736,379	689,305	647,020	**12,988**	9,842	6,778	**1.76**	1.43	1.05
Obligations related to securities sold short	**34,799**	32,642	37,205	**1,995**	1,627	1,515	**5.73**	4.98	4.07
Obligations related to assets sold under repurchase agreements and securities loaned	**262,929**	184,934	128,831	**6,147**	3,261	1,396	**2.34**	1.76	1.08
Subordinated debentures	**9,405**	9,131	9,460	**365**	322	270	**3.88**	3.53	2.85
Other interest-bearing liabilities	**16,496**	15,352	14,839	**89**	17	19	**0.54**	0.11	0.13
Total interest-bearing liabilities	**1,060,008**	931,364	837,355	**21,584**	15,069	9,978	**2.04**	1.62	1.19
Non-interest-bearing deposits	**133,702**	129,696	122,800	**–**	–	–	**–**	–	–
Acceptances	**17,473**	16,030	14,549	**–**	–	–	**–**	–	–
Other liabilities (4)	**143,948**	142,122	139,293	**–**	–	–	**–**	–	–
Total liabilities	**$1,355,131**	$ 1,219,212	$ 1,113,997	**$21,584**	$ 15,069	$ 9,978	**1.59%**	1.24%	0.90%
Equity	**81,052**	75,720	72,607	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.
Total liabilities and shareholders' equity	**$1,436,200**	$ 1,294,900	$ 1,186,600	**$21,584**	$ 15,069	$ 9,978	**1.50%**	1.16%	0.84%
Net interest income and margin	**$1,436,200**	$ 1,294,900	$ 1,186,600	**$19,749**	$ 17,952	$ 16,926	**1.38%**	1.39%	1.43%
Net interest income and margin (average earning assets)									
Canada	**$ 700,153**	$ 637,214	$ 595,790	**$14,375**	$ 13,076	$ 12,104	**2.05%**	2.05%	2.03%
U.S.	**329,655**	275,895	243,276	**4,058**	3,616	3,469	**1.23**	1.31	1.43
Other International (4)	**199,898**	179,717	159,912	**1,316**	1,260	1,353	**0.66**	0.70	0.85
Total	**$1,229,706**	$ 1,092,826	$ 998,978	**$19,749**	$ 17,952	$ 16,926	**1.61%**	1.64%	1.69%

(1) Insurance segment assets and liabilities are included in Other assets and Other liabilities, respectively.
(2) Interest income includes loan fees of $672 million (2018 – $621 million; 2017 – $561 million).
(3) Deposits include personal chequing and savings deposits with average balances of $189 billion (2018 – $182 billion; 2017 – $178 billion), interest expense of $1.1 billion (2018 – $0.8 billion; 2017 – $0.5 billion) and average rates of 0.6% (2018 – 0.4%; 2017 – 0.3%). Deposits also include term deposits with average balances of $421 billion (2018 – $389 billion; 2017 – $353 billion), interest expense of $9.2 billion (2018 – $7.4 billion; 2017 – $5.2 billion) and average rates of 2.19% (2018 – 1.89%; 2017 – 1.48%).
(4) 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, is presented in net interest income and other liabilities respectively. Comparative amounts have been reclassified to conform with this presentation.

Change in net interest income — Table 73

(Millions of Canadian dollars) (1)	2019 vs. 2018 Increase (decrease) due to changes in Average volume (2)	Average rate (2)	Net change	2018 vs. 2017 Increase (decrease) due to changes in Average volume (2)	Average rate (2)	Net change
Assets						
Deposits with other banks						
Canada (3)	$ 13	$ 20	$ 33	$ (14)	$ 66	$ 52
U.S. (3)	(33)	109	76	54	183	237
Other international (3)	3	5	8	(8)	(22)	(30)
Securities						
Trading	166	622	788	(152)	417	265
Investment, net of applicable allowance	152	217	369	110	396	506
Asset purchased under reverse repurchase agreements and securities borrowed	1,649	1,775	3,424	890	1,625	2,515
Loans						
Canada						
Retail	571	1,248	1,819	477	1,384	1,861
Wholesale	544	762	1,306	143	5	148
U.S.	634	(543)	91	117	500	617
Other international	124	274	398	70	(123)	(53)
Total interest income	$ 3,823	$ 4,489	$ 8,312	$ 1,687	$ 4,431	$ 6,118
Liabilities						
Deposits						
Canada	635	2,067	2,702	169	1,990	2,159
U.S.	(14)	225	211	156	517	673
Other international (4)	62	171	233	66	167	233
Obligations related to securities sold short	108	260	368	(186)	298	112
Obligations related to assets sold under repurchase agreements and securities loaned	1,375	1,511	2,886	608	1,257	1,865
Subordinated debentures	10	33	43	(9)	61	52
Other interest-bearing liabilities	1	71	72	1	(3)	(2)
Total interest expense	$ 2,177	$ 4,338	$ 6,515	$ 805	$ 4,287	$ 5,092
Net interest income	$ 1,646	$ 151	$ 1,797	$ 882	$ 144	$ 1,026

(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.
(4) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.

Loans and acceptances by geography — Table 74

As at October 31 (Millions of Canadian dollars)	2019	2018	2017	2016	2015
Canada					
Residential mortgages	$ 287,767	$ 265,831	$ 255,799	$ 241,800	$ 229,987
Personal	81,547	82,112	82,022	82,205	84,637
Credit cards	19,617	18,793	17,491	16,601	15,516
Small business	5,434	4,866	4,493	3,878	4,003
Retail	394,365	371,602	359,805	344,484	334,143
Wholesale (1)	142,334	118,627	99,158	86,130	80,284
	$ 536,699	$ 490,229	$ 458,963	$ 430,614	$ 414,427
U.S.					
Retail	24,850	21,033	18,100	17,134	5,484
Wholesale	53,784	59,476	55,037	59,349	34,702
	78,634	80,509	73,137	76,483	40,186
Other International					
Retail	6,871	6,817	7,265	7,852	8,556
Wholesale	17,838	17,837	21,870	21,733	24,536
	24,709	24,654	29,135	29,585	33,092
Total loans and acceptances	$ 640,042	$ 595,392	$ 561,235	$ 536,682	$ 487,705
Total allowance for credit losses	(3,124)	(2,933)	(2,159)	(2,235)	(2,029)
Total loans and acceptances, net of allowance for credit losses	$ 636,918	$ 592,459	$ 559,076	$ 534,447	$ 485,676

(1) In 2015, we reclassified $4 billion from Investment securities (Available-for-sale securities under IAS 39) to Loans.

Loans and acceptances by portfolio and sector (1) — Table 75

As at October 31 (Millions of Canadian dollars)	2019	2018	2017	2016	2015
Residential mortgages	$ 308,091	$ 282,471	$ 270,348	$ 254,998	$ 233,975
Personal	92,250	92,700	92,294	93,466	94,346
Credit cards	20,311	19,415	18,035	17,128	15,859
Small business	5,434	4,866	4,493	3,878	4,003
Retail	$ 426,086	$ 399,452	$ 385,170	$ 369,470	$ 348,183
Agriculture	9,369	8,325	7,397	6,538	6,068
Automotive	9,788	8,761	8,319	7,293	6,625
Banking	2,005	1,826	1,163	1,536	1,911
Consumer discretionary	16,741	15,453	14,428	13,543	8,195
Consumer staples	5,290	4,497	4,581	5,024	3,111
Oil & gas	8,145	6,061	5,599	5,346	6,763
Financial services	24,961	21,350	15,448	10,139	7,965
Financing products	6,368	5,569	4,475	7,255	8,485
Forest products	1,486	1,101	913	1,100	1,171
Governments	4,252	4,103	9,624	8,538	7,631
Industrial products	7,388	7,607	5,674	5,722	4,958
Information technology	4,606	4,635	4,086	5,235	2,017
Investments	14,657	8,987	8,867	7,221	7,040
Mining & metals	1,179	1,301	1,114	1,456	1,518
Public works & infrastructure	1,717	1,853	1,586	1,626	1,635
Real estate & related	54,032	49,889	44,759	38,164	32,057
Other services	21,373	18,467	16,492	17,092	12,769
Telecommunication & media	4,757	7,018	4,867	5,765	4,590
Transportation	5,426	5,347	5,223	5,110	5,044
Utilities	8,826	8,239	6,870	8,752	6,209
Other sectors	1,590	5,551	4,580	4,757	3,760
Wholesale	$ 213,956	$ 195,940	$ 176,065	$ 167,212	$ 139,522
Total loans and acceptances	$ 640,042	$ 595,392	$ 561,235	$ 536,682	$ 487,705
Total allowance for credit losses	(3,124)	(2,933)	(2,159)	(2,235)	(2,029)
Total loans and acceptances, net of allowance for credit losses	$ 636,918	$ 592,459	$ 559,076	$ 534,447	$ 485,676

(1) Sectors have been revised from those previously presented to align with our view of credit risk by industry.

Gross impaired loans by portfolio and geography (1) — Table 76

As at October 31 (Millions of Canadian dollars, except for percentage amounts)	2019	2018	2017	2016	2015
Residential mortgages	$ 732	$ 725	$ 634	$ 709	$ 646
Personal	306	302	276	304	299
Small business	57	44	38	46	45
Retail	1,095	1,071	948	1,059	990
Agriculture	$ 37	$ 29	$ 28	$ 37	$ 41
Automotive	28	7	29	43	11
Banking	10	18	26	2	2
Consumer discretionary	171	138	77	181	130
Consumer staples	51	23	55	36	41
Oil & gas	509	230	318	1,263	154
Financial services	81	80	113	114	110
Financing products	–	–	–	–	–
Forest products	35	9	7	21	28
Governments	5	15	8	2	2
Industrial products	92	42	34	43	45
Information technology	16	2	70	66	6
Investments	7	8	25	70	183
Mining & metals	1	2	3	15	17
Public works & infrastructure	12	3	4	16	24
Real estate & related	408	290	340	225	274
Other services	134	73	158	97	54
Telecommunication & media	12	8	12	27	28
Transportation	13	58	7	31	38
Utilities	211	8	10	79	57
Other sectors	35	48	48	58	50
Wholesale	1,868	1,091	1,372	2,426	1,295
Acquired credit-impaired loans	13	21	256	418	–
Total GIL (2) (3)	$ 2,976	$ 2,183	$ 2,576	$ 3,903	$ 2,285
Canada					
Residential mortgages	$ 481	$ 431	$ 323	$ 368	$ 356
Personal	250	248	198	228	223
Small business	57	44	38	46	45
Retail	788	723	559	642	624
Agriculture	36	29	22	27	39
Automotive	18	5	4	9	8
Banking	10	18	26	–	–
Consumer discretionary	71	62	54	105	76
Consumer staples	24	10	10	14	15
Oil & gas	97	38	16	56	38
Financial services	–	1	3	–	–
Financing products	–	–	–	–	–
Forest products	9	9	7	21	5
Governments	5	11	2	2	1
Industrial products	48	31	25	40	39
Information technology	4	1	2	4	6
Investments	2	–	1	3	2
Mining & metals	1	2	3	12	7
Public works & infrastructure	10	3	4	16	24
Real estate & related	195	134	182	105	137
Other services	65	24	47	58	52
Telecommunication & media	11	7	10	24	28
Transportation	13	11	7	10	15
Utilities	59	–	1	16	20
Other sectors	–	–	–	–	–
Wholesale	678	396	426	522	512
Total	$ 1,466	$ 1,119	$ 985	$ 1,164	$ 1,136
U.S.					
Retail	$ 36	$ 23	$ 59	$ 56	$ 10
Wholesale	869	401	736	1,736	204
Total	$ 905	$ 424	$ 795	$ 1,792	$ 214
Other International					
Retail	$ 272	$ 327	$ 345	$ 380	$ 356
Wholesale	333	313	451	567	579
Total	$ 605	$ 640	$ 796	$ 947	$ 935
Total GIL (2) (3)	$ 2,976	$ 2,183	$ 2,576	$ 3,903	$ 2,285
Allowance on impaired loans (4)	(832)	(700)	(737)	(809)	(654)
Net impaired loans	$ 2,144	$ 1,483	$ 1,839	$ 3,094	$ 1,631
GIL as a % of loans and acceptances					
Residential mortgages	0.24%	0.26%	0.23%	0.28%	0.28%
Personal	0.33%	0.33%	0.30%	0.33%	0.32%
Small business	1.05%	0.90%	0.85%	1.19%	1.13%
Retail	0.26%	0.27%	0.25%	0.29%	0.28%
Wholesale	0.88%	0.57%	0.92%	1.69%	0.93%
Total	0.46%	0.37%	0.46%	0.73%	0.47%
Allowance on impaired loans as a % of GIL (4)	27.96%	32.08%	28.61%	20.72%	28.64%

(1) Sectors have been revised from those previously presented to align with our view of credit risk by industry.
(2) Effective November 1, 2017, the definition of gross impaired loans has been shortened for certain products to align with a definition of default of 90 days past due under IFRS 9. Past due loans greater than 90 days not included in impaired loans were $189 million in 2019 (2018 – $179 million; 2017 – $307 million; 2016 – $337 million; 2015 – $314 million). For further details, refer to Note 5 of our 2019 Annual Consolidated Financial Statements.
(3) Effective November 1, 2017, GIL excludes $229 million of acquired credit impaired loans related to our acquisition of City National that have returned to performing status.
(4) Effective November 1, 2017, represents Stage 3 ACL on loans, acceptances, and commitments under IFRS 9 and Allowances for impaired loans under IAS 39.

Provision for credit losses by portfolio and geography (1)

Table 77

(Millions of Canadian dollars, except for percentage amounts)	2019	2018	2017	2016	2015
Residential mortgages	$ 51	$ 51	$ 56	$ 77	$ 47
Personal	487	462	409	458	388
Credit cards	518	468	435	442	378
Small business	36	30	32	34	32
Retail	1,092	1,011	932	1,011	845
Agriculture	$ 8	$ 1	$ 4	$ 10	$ 8
Automotive	10	5	14	13	2
Banking	–	(1)	3	(3)	(1)
Consumer discretionary	61	81	12	20	43
Consumer staples	33	1	6	10	8
Oil & gas	98	1	(28)	320	47
Financial services	–	–	(18)	1	47
Financing products	–	–	–	–	–
Forest products	9	3	3	3	5
Governments	6	4	1	–	1
Industrial products	104	8	11	10	(1)
Information technology	30	(21)	4	7	1
Investments	–	3	–	1	19
Mining & metals	–	–	(4)	6	7
Public works & infrastructure	57	2	1	3	3
Real estate & related	57	13	120	34	28
Other services	35	22	20	(1)	17
Telecommunication & media	7	–	8	1	4
Transportation	9	32	1	(6)	5
Utilities	70	1	5	16	9
Other sectors	5	(8)	53	30	–
Wholesale	599	147	216	475	252
Acquired credit-impaired loans	–	2	2	10	–
Total PCL on impaired loans (2)	$ 1,691	$ 1,160	$ 1,150	$ 1,496	$ 1,097
Canada					
Residential mortgages	$ 32	$ 44	$ 33	$ 42	$ 27
Personal	488	458	413	459	393
Credit cards	505	456	426	435	371
Small business	36	30	32	34	32
Retail	1,061	988	904	970	823
Agriculture	8	1	2	10	8
Automotive	4	1	1	3	2
Banking	–	(1)	3	–	–
Consumer discretionary	24	28	20	27	29
Consumer staples	14	2	3	5	6
Oil & gas	34	4	(17)	99	22
Financial services	–	–	–	–	–
Financing products	–	–	–	–	–
Forest products	5	3	3	4	1
Governments	4	1	1	1	1
Industrial products	27	6	8	8	2
Information technology	28	1	1	2	2
Investments	–	–	–	1	–
Mining & metals	–	–	1	5	2
Public works & infrastructure	45	1	1	3	3
Real estate & related	53	14	43	23	12
Other services	29	17	15	18	18
Telecommunication & media	5	–	9	1	4
Transportation	9	2	2	3	3
Utilities	2	–	–	–	1
Other sectors	1	–	(1)	–	–
Wholesale	292	80	95	213	116
Total (2)	$ 1,353	$ 1,068	$ 999	$ 1,183	$ 939
U.S.					
Retail	$ 12	$ 4	$ 3	$ 1	$ 1
Wholesale	223	64	117	227	40
	$ 235	$ 68	$ 120	$ 228	$ 41
Other International					
Retail	$ 19	$ 19	$ 25	$ 41	$ 21
Wholesale	84	5	6	44	96
	$ 103	$ 24	$ 31	$ 85	$ 117
Total PCL on impaired loans (2)	$ 1,691	$ 1,160	$ 1,150	$ 1,496	$ 1,097
Total PCL on performing loans (3)	200	123	–	50	–
Total PCL on other financial assets	(27)	24			
Total PCL	$ 1,864	$ 1,307	$ 1,150	$ 1,546	$ 1,097
PCL on loans as a % of average net loans and acceptances	0.31%	0.23%	0.21%	0.29%	0.24%
PCL on impaired loans as a % of average net loans and acceptances (2)	0.27%	0.20%	0.21%	0.28%	0.24%

(1) Sectors have been revised from those previously presented to align with our view of credit risk by industry.
(2) Effective November 1, 2017, represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39.
(3) Effective November 1, 2017, represents Stage 1 and 2 PCL on loans, acceptances, and commitments under IFRS 9 and PCL for loans not yet identified as impaired under IAS 39.

Allowance on loans by portfolio and geography (1) (2) — Table 78

(Millions of Canadian dollars, except percentage amounts)	2019	2018	2017	2016	2015
Allowance on loans at beginning of year	$ 3,088	$ 2,976	$ 2,326	$ 2,120	$ 2,085
Provision for credit losses (2)	1,891	1,283	1,150	1,546	1,097
Write-offs by portfolio					
Residential mortgages	(45)	(51)	(53)	(42)	(64)
Personal	(600)	(552)	(543)	(556)	(494)
Credit cards	(655)	(599)	(565)	(564)	(497)
Small business	(36)	(35)	(38)	(40)	(40)
Retail	$ (1,336)	$ (1,237)	$ (1,199)	$ (1,202)	$ (1,095)
Wholesale	$ (440)	$ (207)	$ (226)	$ (321)	$ (243)
Total write-offs by portfolio	$ (1,776)	$ (1,444)	$ (1,425)	$ (1,523)	$ (1,338)
Recoveries by portfolio					
Residential mortgages	$ 8	$ 8	$ 8	$ 5	$ 7
Personal	126	121	116	111	105
Credit cards	137	131	131	122	119
Small business	8	7	9	10	10
Retail	$ 279	$ 267	$ 264	$ 248	$ 241
Wholesale	$ 43	$ 65	$ 66	$ 38	$ 34
Total recoveries by portfolio	$ 322	$ 332	$ 330	$ 286	$ 275
Net write-offs	$ (1,454)	$ (1,112)	$ (1,095)	$ (1,237)	$ (1,063)
Exchange rate and other	(106)	(59)	(131)	(103)	1
Total allowance on loans at end of year	$ 3,419	$ 3,088	$ 2,250	$ 2,326	$ 2,120
Allowance against impaired loans (3)					
Canada					
Residential mortgages	$ 50	$ 43	$ 31	$ 35	$ 27
Personal	115	107	91	105	96
Small business	22	18	19	20	19
Retail	$ 187	$ 168	$ 141	$ 160	$ 142
Agriculture	$ 6	$ 4	$ 5	$ 6	$ 5
Automotive	3	4	4	4	4
Banking	–	1	2	–	–
Consumer discretionary	11	22	18	20	20
Consumer staples	2	3	2	4	3
Oil & gas	29	4	4	7	1
Financial services	–	–	1	–	–
Financing products	–	–	–	–	–
Forest products	7	3	3	5	3
Governments	5	1	1	1	–
Industrial products	11	8	9	10	13
Information technology	3	–	1	1	2
Investments	2	–	–	1	–
Mining & metals	1	–	3	3	1
Public works & infrastructure	1	1	1	2	2
Real estate & related	35	28	47	29	35
Other services	34	7	17	19	13
Telecommunication & media	11	3	4	4	6
Transportation	10	3	2	3	2
Utilities	1	–	–	–	1
Other sectors	–	–	–	–	–
Wholesale	$ 172	$ 92	$ 124	$ 119	$ 111
	$ 359	$ 260	$ 265	$ 279	$ 253
U.S.					
Retail	$ 1	$ 1	$ 1	$ 2	$ 1
Wholesale	141	164	150	177	47
	$ 142	$ 165	$ 151	$ 179	$ 48
Other International					
Retail	$ 156	$ 166	$ 168	$ 180	$ 169
Wholesale	175	109	153	171	184
	$ 331	$ 275	$ 321	$ 351	$ 353
Total allowance on impaired loans (3)	$ 832	$ 700	$ 737	$ 809	$ 654
Allowance on performing loans (4)					
Residential mortgages	$ 223	$ 206	$ 128	$ 96	$ 83
Personal	792	754	391	385	396
Credit cards	832	760	379	386	386
Small business	39	33	37	45	45
Retail	$ 1,886	$ 1,753	$ 935	$ 912	$ 910
Wholesale	$ 701	$ 635	$ 487	$ 514	$ 465
Off-balance sheet and other items			$ 91	$ 91	$ 91
Total allowance on performing loans (4)	$ 2,587	$ 2,388	$ 1,513	$ 1,517	$ 1,466
Total allowance on loans	$ 3,419	$ 3,088	$ 2,250	$ 2,326	$ 2,120
Key ratios					
Allowance on loans as a % of loans and acceptances	0.53%	0.52%	0.40%	0.43%	0.43%
Net write-offs as a % of average net loans and acceptances	0.24%	0.20%	0.20%	0.23%	0.23%

(1) Sectors have been revised from those previously presented to align with our view of credit risk by industry.
(2) Includes loans, acceptances, and commitments.
(3) Effective November 1, 2017, represents Stage 3 ACL on loans, acceptances, and commitments under IFRS 9 and Allowance for impaired loans under IAS 39.
(4) Effective November 1, 2017, represents Stage 1 and Stage 2 ACL on loans, acceptances, and commitments under IFRS 9 and Allowance for loans not yet identified as impaired under IAS 39.

Credit quality information by Canadian province — Table 79

(Millions of Canadian dollars)	2019	2018	2017	2016	2015
Loans and acceptances					
Atlantic provinces (1)	**$ 27,008**	$ 25,305	$ 24,471	$ 23,947	$ 23,040
Quebec	**62,734**	58,067	56,749	53,518	51,197
Ontario	**257,009**	225,606	202,272	185,434	175,315
Alberta	**71,165**	69,497	68,051	66,277	64,902
Other Prairie provinces (2)	**33,278**	32,101	31,318	30,143	29,490
B.C. and territories (3)	**85,505**	79,653	76,102	71,295	70,483
Total loans and acceptances in Canada	**$ 536,699**	$ 490,229	$ 458,963	$ 430,614	$ 414,427
Gross impaired loans (4)					
Atlantic provinces (1)	**$ 94**	$ 89	$ 77	$ 101	$ 93
Quebec	**250**	185	176	207	213
Ontario	**290**	227	213	336	341
Alberta	**448**	335	284	313	224
Other Prairie provinces (2)	**215**	176	125	93	115
B.C. and territories (3)	**169**	107	110	114	150
Total GIL in Canada	**$ 1,466**	$ 1,119	$ 985	$ 1,164	$ 1,136
Provision for credit losses on impaired loans (5)					
Atlantic provinces (1)	**$ 73**	$ 59	$ 66	$ 67	$ 57
Quebec	**104**	94	85	92	96
Ontario	**844**	678	617	654	590
Alberta	**175**	116	112	226	77
Other Prairie provinces (2)	**85**	68	64	64	52
B.C. and territories (3)	**72**	53	55	80	67
Total PCL on impaired loans in Canada	**$ 1,353**	$ 1,068	$ 999	$ 1,183	$ 939

(1) Comprises Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick.
(2) Comprises Manitoba and Saskatchewan.
(3) Comprises British Columbia, Nunavut, Northwest Territories and Yukon.
(4) Effective November 1, 2017, the definition of gross impaired loans has been shortened for certain products to align with a definition of default of 90 days past due under IFRS 9.
(5) Effective November 1, 2017, represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39.

EDTF recommendations index

We aim to present transparent, high-quality risk disclosures by providing disclosures in our 2019 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 our 2019 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	110	1
	2	Define risk terminology and measures	49-54, 213-214	–
	3	Top and emerging risks	47-48	–
	4	New regulatory ratios	90-94	–
Risk governance, risk management and business model	5	Risk management organization	49-54	–
	6	Risk culture	50-54	–
	7	Risk in the context of our business activities	97	–
	8	Stress testing	51-52, 66	–
Capital adequacy and risk-weighted assets (RWA)	9	Minimum Basel III capital ratios and Domestic systemically important bank surcharge	90-94	–
	10	Composition of capital and reconciliation of the accounting balance sheet to the regulatory balance sheet	–	20-23
	11	Flow statement of the movements in regulatory capital	–	24
	12	Capital strategic planning	90-94	–
	13	RWA by business segments	–	25
	14	Analysis of capital requirement, and related measurement model information	55-58	*
	15	RWA credit risk and related risk measurements	–	*
	16	Movement of risk-weighted assets by risk type	–	25
	17	Basel back-testing	51, 55	37
Liquidity	18	Quantitative and qualitative analysis of our liquidity reserve	72-74, 78-79	–
Funding	19	Encumbered and unencumbered assets by balance sheet category, and contractual obligations for rating downgrades	74, 77	–
	20	Maturity analysis of consolidated total assets, liabilities and off-balance sheet commitments analyzed by remaining contractual maturity at the balance sheet date	79-80	–
	21	Sources of funding and funding strategy	74-76	–
Market risk	22	Relationship between the market risk measures for trading and non-trading portfolios and the balance sheet	70-71	–
	23	Decomposition of market risk factors	66-69	–
	24	Market risk validation and back-testing	66	–
	25	Primary risk management techniques beyond reported risk measures and parameters	66-69	–
Credit risk	26	Bank's credit risk profile	54-65, 156-163	26-37,*
		Quantitative summary of aggregate credit risk exposures that reconciles to the balance sheet	104-109	*
	27	Policies for identifying impaired loans	56-58, 99-100, 129-132	–
	28	Reconciliation of the opening and closing balances of impaired loans and impairment allowances during the year	–	28,33
	29	Quantification of gross notional exposure for OTC derivatives or exchange-traded derivatives	59	39
	30	Credit risk mitigation, including collateral held for all sources of credit risk	57-58	36
Other	31	Other risk types	82-89	–
	32	Publicly known risk events	85-86, 201-202	–

* These disclosure requirements are satisfied or partially satisfied by disclosures provided in our Pillar 3 Report as at October 31, 2019 and October 31, 2018.

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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 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

Rod Bolger
Chief Financial Officer

Toronto, December 3, 2019

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, 2019, 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, 2019, 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, 2019, 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

Rod Bolger
Chief Financial Officer

Toronto, December 3, 2019

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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, 2019 and 2018, 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, 2019, 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, 2019 and 2018, 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 (IFRS). Also in our opinion, the Bank maintained, in all material respects, effective internal control over financial reporting as of October 31, 2019, 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.

Valuation of the Allowance for Credit Losses (ACL)
As described in Notes 2, 4 and 5 to the consolidated financial statements, the Bank's ACL for financial assets was $3,440 million as at October 31, 2019, and represents management's estimate of expected credit losses on financial assets as at the balance sheet date. 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. Impaired financial assets are categorized as Stage 3 when the asset is 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 the financial asset's probability of default, loss given default, and exposure at default discounted at the reporting date. Management's estimation of expected credit losses in Stage 1 and Stage 2 considers five distinct future macroeconomic scenarios, each of which includes forward-looking information designed to capture a wide range of possible outcomes and are weighted according to

management's expectation of the relative likelihood of the range of outcomes that each scenario represents at the reporting date. Management's scenarios include a base case, upside and downside scenarios which are set by adjusting the base projections to construct reasonably possible scenarios that are more optimistic and pessimistic, respectively, than the base case. Two additional downside scenarios were designed for the real estate and energy sectors to capture the non-linear nature of potential credit losses across the Bank's portfolios of financial assets.

The principal consideration for our determination that performing procedures relating to the valuation of the ACL is a critical audit matter is that there was significant judgment required by management when designing the future macroeconomic scenarios and assigning weights to each scenario to determine the Stage 1 and Stage 2 ACL. This in turn led to a high degree of auditor subjectivity in performing audit procedures relating to these scenarios. In addition, significant auditor judgment and significant audit effort was necessary to evaluate audit evidence as the measurement of expected credit losses is a complex calculation that involves a large volume of data, interrelated inputs and assumptions. The audit effort also included the use of professionals with specialized skill and knowledge to assist in evaluating the audit evidence obtained.

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 valuation of the ACL, including controls over the design of multiple future macroeconomic scenarios, the determination and application of the weightings for these scenarios, and the completeness and accuracy of the data inputs underlying the ACL calculation. These procedures also included, among others, testing management's process for determining the Stage 1 and Stage 2 ACL, including evaluating the appropriateness of the models used to determine the Stage 1 and Stage 2 ACL, testing the completeness, accuracy, and relevance of underlying data used in the model, and evaluating the reasonableness of significant assumptions related to the determination of significant increases in credit risk relative to the initial recognition of the financial asset, the determination of the future macroeconomic scenarios and the weights assigned thereto. Professionals with specialized skill and knowledge were used to assist in testing the appropriateness of the complex expected credit loss calculation and its interrelated inputs and assumptions. Evaluating management's assumptions related to the determination of macroeconomic scenarios involved evaluating the identification of material portfolios of financial assets that have exhibited a non-linear nature of potential credit losses, and evaluating the reasonableness of potential credit losses under the five future macroeconomic scenarios considering the Bank's historical loss experience.

Goodwill Impairment Assessment of the Caribbean Banking Cash Generating Unit (CGU)
As described in Notes 2 and 10 to the consolidated financial statements, the goodwill allocated to the Caribbean Banking CGU was $1,727 million. Management conducts an impairment test as of August 1 of each year by comparing the carrying value of each CGU to its recoverable amount. For the Caribbean Banking CGU, management calculated the recoverable amount as the fair value less costs of disposal using a discounted cash flow model that projects future cash flows based on management forecasts, adjusted to approximate the considerations of a prospective third-party buyer, over a 5-year period. 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. As disclosed by management, the Caribbean continued to experience challenges in various regions resulting in weak to moderate economic growth during the year. As at August 1, 2019, the recoverable amount of the Caribbean Banking CGU, based on management's estimated fair value less costs of disposal, was 126% of its carrying amount. As management has disclosed, the determination of fair value using a discounted cash flow model requires the use of significant judgment to determine the inputs and the model is most sensitive to changes in future cash flows, discount rates, and terminal growth rates applied to cash flows beyond the forecast period. If the post-tax discount rate was increased by 1.8%, holding other individual factors constant, the recoverable amount would approximate the carrying amount.

The principal consideration for our determination that performing procedures relating to the goodwill impairment assessment of the Caribbean Banking CGU is a critical audit matter is that there was significant judgment required by management when determining the fair value of the CGU including future cash flows and adjustments made thereto to approximate the considerations of a prospective third-party buyer, discount rates and terminal growth rates. This in turn led to a high degree of auditor judgment and subjectivity in performing procedures over management's calculation of the recoverable amount of the CGU, and evaluating audit evidence. In addition, the audit effort included the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

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 CGU. These procedures also included, among others, testing management's process for determining the recoverable amount of the CGU, evaluating the appropriateness of the discounted cash flow model, and testing the completeness, accuracy, and relevance of underlying data used in the model. These procedures also included evaluating the significant assumptions used by management, including the discount rates, terminal growth rates, and future cash flows and adjustments made thereto to approximate the considerations of a prospective third-party buyer. Professionals with specialized skill and knowledge were used to assist in evaluating management's discounted cash flow model and certain significant assumptions, including the discount rates and terminal growth rates. Evaluating management's assumptions related to terminal growth rates and future cash flows involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of the CGU, (ii) the consistency with external market data and industry data; and (iii) whether these assumptions were consistent with evidence obtained in other areas of the audit.

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 relevant taxation authorities. In some cases, as described in Note 23, the Bank has received reassessments denying the tax deductibility of dividends from transactions including those with Tax Indifferent Investors. As disclosed by management, significant judgment is required in the interpretation of the relevant tax laws, and the determination of the Bank's tax provision, which includes management's best estimate of tax positions that are under audit or appeal by relevant taxation authorities. The forward-looking nature of these estimates requires management to use a significant amount of judgment in projecting the timing and amount of future cash flows. As management has further disclosed, management records provisions related to uncertain tax positions on the basis of all available information at the end of the reporting period to reflect current expectations.

The principal consideration for our determination that performing procedures relating to the uncertain tax positions is a critical audit matter is that there was significant judgment required by management, including a high degree of estimation uncertainty, when interpreting the relevant tax laws and projecting the amount of future cash flows relating to uncertain tax positions. This in turn led to a high degree of auditor judgment and subjectivity in performing procedures to evaluate the uncertain tax positions. In addition, the audit effort included the use of professionals with specialized skill and knowledge to assist in evaluating the audit evidence obtained.

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. These procedures also included, among others, testing management's process used in estimating the amount of future cash flows relating to uncertain tax positions. This involved evaluating the appropriateness of the methods used, testing the completeness, accuracy, and relevance of underlying data used, and evaluating the reasonableness of significant assumptions used by management for estimating the results of tax positions that are under audit or appeal by relevant taxation authorities. Professionals with specialized skill and knowledge were used to assist in assessing the significant assumptions, including the application of relevant tax laws and whether it is probable that the relevant tax authorities will accept the tax positions, and evidence used by management in determining and projecting the amount of future cash flows.

PricewaterhouseCoopers LLP

Chartered Professional Accountants, Licensed Public Accountants
Toronto, Canada
December 3, 2019

We have served as the Bank's auditor since 2016.

Consolidated Balance Sheets

(Millions of Canadian dollars)	As at October 31 2019	As at October 31 2018
Assets		
Cash and due from banks	**$ 26,310**	$ 30,209
Interest-bearing deposits with banks	**38,345**	36,471
Securities (Note 4)		
Trading	**146,534**	128,258
Investment, net of applicable allowance	**102,470**	94,608
	249,004	222,866
Assets purchased under reverse repurchase agreements and securities borrowed	**306,961**	294,602
Loans (Note 5)		
Retail	**426,086**	399,452
Wholesale	**195,870**	180,278
	621,956	579,730
Allowance for loan losses (Note 5)	**(3,100)**	(2,912)
	618,856	576,818
Segregated fund net assets (Note 16)	**1,663**	1,368
Other		
Customers' liability under acceptances	**18,062**	15,641
Derivatives (Note 8)	**101,560**	94,039
Premises and equipment (Note 9)	**3,191**	2,832
Goodwill (Note 10)	**11,236**	11,137
Other intangibles (Note 10)	**4,674**	4,687
Other assets (Note 13)	**49,073**	44,064
	187,796	172,400
Total assets	**$ 1,428,935**	$ 1,334,734
Liabilities and equity		
Deposits (Note 14)		
Personal	**$ 294,732**	$ 270,154
Business and government	**565,482**	533,522
Bank	**25,791**	32,521
	886,005	836,197
Segregated fund net liabilities (Note 16)	**1,663**	1,368
Other		
Acceptances	**18,091**	15,662
Obligations related to securities sold short	**35,069**	32,247
Obligations related to assets sold under repurchase agreements and securities loaned	**226,586**	206,814
Derivatives (Note 8)	**98,543**	90,238
Insurance claims and policy benefit liabilities (Note 15)	**11,401**	10,000
Other liabilities (Note 18)	**58,137**	53,122
	447,827	408,083
Subordinated debentures (Note 19)	**9,815**	9,131
Total liabilities	**1,345,310**	1,254,779
Equity attributable to shareholders (Note 21)		
Preferred shares	**5,707**	6,309
Common shares	**17,587**	17,617
Retained earnings	**55,981**	51,112
Other components of equity	**4,248**	4,823
	83,523	79,861
Non-controlling interests	**102**	94
Total equity	**83,625**	79,955
Total liabilities and equity	**$ 1,428,935**	$ 1,334,734

The accompanying notes are an integral part of these Consolidated Financial Statements.

David I. McKay
President and Chief Executive Officer

David F. Denison
Director

Consolidated Statements of Income

(Millions of Canadian dollars, except per share amounts)	For the year ended October 31 2019	October 31 2018
Interest and dividend income (Note 3)		
Loans	**$ 24,863**	$ 21,249
Securities	**6,827**	5,670
Assets purchased under reverse repurchase agreements and securities borrowed	**8,960**	5,536
Deposits and other	**683**	566
	41,333	33,021
Interest expense (Note 3)		
Deposits and other	**12,988**	9,842
Other liabilities	**8,231**	4,905
Subordinated debentures	**365**	322
	21,584	15,069
Net interest income	**19,749**	17,952
Non-interest income		
Insurance premiums, investment and fee income (Note 15)	**5,710**	4,279
Trading revenue	**995**	1,150
Investment management and custodial fees	**5,748**	5,377
Mutual fund revenue	**3,628**	3,551
Securities brokerage commissions	**1,305**	1,372
Service charges	**1,907**	1,800
Underwriting and other advisory fees	**1,815**	2,053
Foreign exchange revenue, other than trading	**986**	1,098
Card service revenue	**1,072**	1,054
Credit fees	**1,269**	1,394
Net gains on investment securities	**125**	147
Share of profit in joint ventures and associates (Note 12)	**76**	21
Other	**1,617**	1,328
	26,253	24,624
Total revenue	**46,002**	42,576
Provision for credit losses (Notes 4 and 5)	**1,864**	1,307
Insurance policyholder benefits, claims and acquisition expense (Note 15)	**4,085**	2,676
Non-interest expense		
Human resources (Notes 17 and 22)	**14,600**	13,776
Equipment	**1,777**	1,593
Occupancy	**1,635**	1,558
Communications	**1,090**	1,049
Professional fees	**1,305**	1,379
Amortization of other intangibles (Note 10)	**1,197**	1,077
Other	**2,535**	2,401
	24,139	22,833
Income before income taxes	**15,914**	15,760
Income taxes (Note 23)	**3,043**	3,329
Net income	**$ 12,871**	$ 12,431
Net income attributable to:		
Shareholders	**$ 12,860**	$ 12,400
Non-controlling interests	**11**	31
	$ 12,871	$ 12,431
Basic earnings per share (in dollars) (Note 24)	**$ 8.78**	$ 8.39
Diluted earnings per share (in dollars) (Note 24)	**8.75**	8.36
Dividends per common share (in dollars)	**4.07**	3.77

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 2019	October 31 2018
Net income	**$ 12,871**	$ 12,431
Other comprehensive income (loss), net of taxes (Note 23)		
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	**192**	(70)
Provision for credit losses recognized in income	**(14)**	(9)
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	**(133)**	(94)
	45	(173)
Foreign currency translation adjustments		
Unrealized foreign currency translation gains (losses)	**65**	840
Net foreign currency translation gains (losses) from hedging activities	**5**	(237)
Reclassification of losses (gains) on foreign currency translation to income	**2**	–
Reclassification of losses (gains) on net investment hedging activities to income	**1**	–
	73	603
Net change in cash flow hedges		
Net gains (losses) on derivatives designated as cash flow hedges	**(559)**	150
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	**(135)**	107
	(694)	257
Items that will not be reclassified subsequently to income:		
Remeasurements of employee benefit plans (Note 17)	**(942)**	724
Net fair value change due to credit risk on financial liabilities designated as fair value through profit or loss	**51**	123
Net gains (losses) on equity securities designated at fair value through other comprehensive income	**25**	(2)
	(866)	845
Total other comprehensive income (loss), net of taxes	**(1,442)**	1,532
Total comprehensive income (loss)	**$ 11,429**	$ 13,963
Total comprehensive income attributable to:		
Shareholders	**$ 11,419**	$ 13,931
Non-controlling interests	**10**	32
	$ 11,429	$ 13,963

The accompanying notes are an integral part of these Consolidated Financial Statements.

Consolidated Statements of Changes in Equity

(Millions of Canadian dollars)	Preferred shares	Common shares	Treasury shares – preferred	Treasury shares – common	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, 2019												
Balance at beginning of period	$ 6,306	$ 17,635	$ 3	$ (18)	$ 51,112	$ (12)	$ 4,147	$ 688	$ 4,823	$ 79,861	$ 94	$ 79,955
Transition adjustment (Note 2)	–	–	–	–	(94)	–	–	–	–	(94)	–	(94)
Adjusted balance at beginning of period	$ 6,306	$ 17,635	$ 3	$ (18)	$ 51,018	$ (12)	$ 4,147	$ 688	$ 4,823	$ 79,767	$ 94	$ 79,861
Changes in equity												
Issues of share capital	350	136	–	–	–	–	–	–	–	486	–	486
Common shares purchased for cancellation	–	(126)	–	–	(904)	–	–	–	–	(1,030)	–	(1,030)
Redemption of preferred shares	(950)	–	–	–	–	–	–	–	–	(950)	–	(950)
Sales of treasury shares	–	–	182	5,340	–	–	–	–	–	5,522	–	5,522
Purchases of treasury shares	–	–	(184)	(5,380)	–	–	–	–	–	(5,564)	–	(5,564)
Share-based compensation awards	–	–	–	–	(23)	–	–	–	–	(23)	–	(23)
Dividends on common shares	–	–	–	–	(5,840)	–	–	–	–	(5,840)	–	(5,840)
Dividends on preferred shares and other	–	–	–	–	(269)	–	–	–	–	(269)	(2)	(271)
Other	–	–	–	–	5	–	–	–	–	5	–	5
Net income	–	–	–	–	12,860	–	–	–	–	12,860	11	12,871
Total other comprehensive income (loss), net of taxes	–	–	–	–	(866)	45	74	(694)	(575)	(1,441)	(1)	(1,442)
Balance at end of period	$ 5,706	$ 17,645	$ 1	$ (58)	$ 55,981	$ 33	$ 4,221	$ (6)	$ 4,248	$ 83,523	$ 102	$ 83,625

(Millions of Canadian dollars)	Preferred shares	Common shares	Treasury shares – preferred	Treasury shares – common	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, 2018												
Balance at beginning of period	$ 6,413	$ 17,730	$ –	$ (27)	$ 44,801	$ 299	$ 3,545	$ 431	$ 4,275	$ 73,192	$ 599	$ 73,791
Changes in equity												
Issues of share capital	–	92	–	–	–	–	–	–	–	92	–	92
Common shares purchased for cancellation	–	(187)	–	–	(1,335)	–	–	–	–	(1,522)	–	(1,522)
Redemption of preferred shares	(107)	–	–	–	2	–	–	–	–	(105)	–	(105)
Redemption of trust capital securities	–	–	–	–	–	–	–	–	–	–	(500)	(500)
Sales of treasury shares	–	–	259	5,479	–	–	–	–	–	5,738	–	5,738
Purchases of treasury shares	–	–	(256)	(5,470)	–	–	–	–	–	(5,726)	–	(5,726)
Share-based compensation awards	–	–	–	–	(10)	–	–	–	–	(10)	–	(10)
Dividends on common shares	–	–	–	–	(5,442)	–	–	–	–	(5,442)	–	(5,442)
Dividends on preferred shares and other	–	–	–	–	(285)	–	–	–	–	(285)	(37)	(322)
Other	–	–	–	–	136	(138)	–	–	(138)	(2)	–	(2)
Net income	–	–	–	–	12,400	–	–	–	–	12,400	31	12,431
Total other comprehensive income (loss), net of taxes	–	–	–	–	845	(173)	602	257	686	1,531	1	1,532
Balance at end of period	$ 6,306	$ 17,635	$ 3	$ (18)	$ 51,112	$ (12)	$ 4,147	$ 688	$ 4,823	$ 79,861	$ 94	$ 79,955

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 2019	October 31 2018
Cash flows from operating activities		
Net income	**$ 12,871**	$ 12,431
Adjustments for non-cash items and others		
Provision for credit losses	**1,864**	1,307
Depreciation	**627**	569
Deferred income taxes	**(519)**	459
Amortization and impairment of other intangibles	**1,307**	1,083
Net changes in investments in joint ventures and associates	**(74)**	(1)
Losses (Gains) on investment securities	**(213)**	(149)
Losses (Gains) on disposition of businesses	**(158)**	(40)
Adjustments for net changes in operating assets and liabilities		
Insurance claims and policy benefit liabilities	**1,401**	218
Net change in accrued interest receivable and payable	**199**	162
Current income taxes	**(26)**	(2,707)
Derivative assets	**(7,521)**	984
Derivative liabilities	**8,305**	(1,889)
Trading securities	**(18,276)**	2,297
Loans, net of securitizations	**(42,672)**	(41,477)
Assets purchased under reverse repurchase agreements and securities borrowed	**(12,359)**	(73,626)
Obligations related to assets sold under repurchase agreements and securities loaned	**19,772**	63,730
Obligations related to securities sold short	**2,822**	2,239
Deposits, net of securitizations	**49,808**	48,499
Brokers and dealers receivable and payable	**(480)**	147
Other	**(2,413)**	3,238
Net cash from (used in) operating activities	**14,265**	17,474
Cash flows from investing activities		
Change in interest-bearing deposits with banks	**(1,874)**	(3,809)
Proceeds from sales and maturities of investment securities	**65,377**	57,108
Purchases of investment securities	**(72,435)**	(59,286)
Net acquisitions of premises and equipment and other intangibles	**(2,261)**	(1,980)
Proceeds from dispositions	**173**	14
Cash used in acquisitions	**(106)**	(65)
Net cash from (used in) investing activities	**(11,126)**	(8,018)
Cash flows from financing activities		
Redemption of trust capital securities	**–**	(500)
Issuance of subordinated debentures	**1,500**	–
Repayment of subordinated debentures	**(1,100)**	–
Issue of common shares, net of issuance costs	**105**	72
Common shares purchased for cancellation	**(1,030)**	(1,522)
Issue of preferred shares, net of issuance costs	**350**	–
Redemption of preferred shares	**(950)**	(105)
Sales of treasury shares	**5,522**	5,738
Purchases of treasury shares	**(5,564)**	(5,726)
Dividends paid	**(6,025)**	(5,640)
Dividends/distributions paid to non-controlling interests	**(2)**	(37)
Change in short-term borrowings of subsidiaries	**(263)**	–
Net cash from (used in) financing activities	**(7,457)**	(7,720)
Effect of exchange rate changes on cash and due from banks	**419**	66
Net change in cash and due from banks	**(3,899)**	1,802
Cash and due from banks at beginning of period (1)	**30,209**	28,407
Cash and due from banks at end of period (1)	**$ 26,310**	$ 30,209
Cash flows from operating activities include:		
Amount of interest paid	**$ 19,984**	$ 13,513
Amount of interest received	**39,500**	31,386
Amount of dividends received	**2,209**	1,706
Amount of income taxes paid	**2,977**	5,818

(1) We are required to maintain balances with central banks and other regulatory authorities. The total balances were $2.6 billion as at October 31, 2019 (October 31, 2018 – $2.4 billion; October 31, 2017 – $2.3 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 and Commercial Banking, Wealth Management, Insurance, Investor and Treasury Services and Capital Markets products and services on a global basis. Refer to Note 28 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. Except where otherwise noted, the accounting policies outlined in Note 2 have been consistently applied to all periods presented.

On December 3, 2019, 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. Except where otherwise noted, 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, the allowance for credit losses, insurance claims and policy benefit liabilities, pensions and other post-employment benefits, income taxes, carrying value of goodwill and other intangible assets, litigation provisions, and deferred revenue under the credit card customer loyalty reward program. 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 7	Application of the effective interest method	Note 2
Fair value of financial instruments	Note 2 Note 3	Derecognition of financial assets	Note 2 Note 6
Allowance for credit losses	Note 2 Note 4 Note 5	Income taxes	Note 2 Note 23
Employee benefits	Note 2 Note 17	Provisions	Note 2 Note 25 Note 26
Goodwill and other intangibles	Note 2 Note 10		

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.

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 co-ordinated 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.

Changes in accounting policies

During the first quarter, we adopted IFRS 15 *Revenue from Contracts with Customers* (IFRS 15). As permitted by the transition provisions of IFRS 15, we elected not to restate comparative period results; accordingly, all comparative information is presented in accordance with our previous accounting policies, as indicated below. As a result of the adoption of IFRS 15, we reduced our opening retained earnings by $94 million[1], on an after tax basis as at November 1, 2018 (the date of initial application), to align with the recognition of certain fees with the transfer of the performance obligations.

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

(1) Revised from the amount previously presented.

- 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 Trading revenue or Non-interest income – Other. Dividends and interest income accruing on Trading securities are recorded in Interest income. Interest and dividends accrued on interest-bearing and equity 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 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 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 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 purchases and new originations, derecognitions 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 modeled 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.

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. Following impairment, interest income is recognized on the unwinding of the discount from the initial recognition of impairment.

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 allowance for credit losses 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. 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 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, 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's 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 balance sheet 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 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. 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 8 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.

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.

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 Other components of equity 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.

We predominantly use interest rate swaps to hedge the variability in cash flows related to a variable-rate asset or liability.

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 initially recognized less accumulated amortization and (ii) our best estimate of the present value of the expenditure required to settle the present obligation at the end of the reporting period.

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 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 and health 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 our non-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 the determination of our tax provision, which includes our best estimate of tax positions that are under audit or appeal by relevant taxation authorities. We perform a review on a quarterly basis to incorporate our best assessment based on information available, but additional liability and income tax expense could result based on decisions made 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 and its fair value less costs of disposal. Value in use is the present value of the expected future cash flows from a CGU. Fair value less costs of disposal 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. 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 reflect the expected long-term gross domestic product growth and inflation for the countries within which the CGU operates. Changes in these assumptions may impact the amount of 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 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, up to a maximum of 10 years. 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.

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, uncertain tax positions, asset retirement obligations and other items.

We are required to estimate the results of ongoing legal proceedings, tax positions that are under audit or appeal by relevant taxation authorities, 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.

Commissions and fees – Policies applicable beginning November 1, 2018 (IFRS 15)

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 customers.

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 customers 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 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 customer, 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 customer and have discretion in establishing the price for the commissions and fees earned, which may require judgment.

Commissions and fees – Policies applicable prior to November 1, 2018 (IAS 18 – *Revenue*)
Portfolio management and other management advisory and service fees are recognized based on the applicable service contracts. Fees related to provision of services including asset management, wealth management, financial planning and custody services that cover a specified service period, are recognized over the period in which the service is provided. Investment management and custodial fees are generally calculated as a percentage of daily or period-end net asset values, and are received monthly, quarterly, semi-annually or annually, depending on the terms of the contracts. Management fees are generally derived from AUM when our clients solicit the investment capabilities of an investment manager and administrative fees are derived from AUA where the investment strategy is directed by the client or a designated third party manager. Performance-based fees, which are earned upon exceeding certain benchmarks or performance targets, are recognized only when the benchmark or performance targets are achieved. Fees such as underwriting fees and brokerage fees that are related to the provision of specific transaction type services are recognized when the service has been completed.

When service fees and other costs are incurred in relation to commissions and fees earned and we have significant risks and rewards associated with delivering the service, we record these costs on a gross basis in either Non-interest expense – Other or Non-interest expense – Human resources, as applicable.

Leasing
A lease is an agreement whereby the lessor conveys to the lessee the right to use an asset for an agreed upon period of time in return for a payment or series of payments. A finance lease is a lease that transfers substantially all the risks and rewards incidental to ownership of the leased asset to the lessee, where title may or may not eventually be transferred. An operating lease is a lease other than a finance lease.

Operating leases
When we are the lessee in an operating lease, we record rental payments on a straight-line basis over the lease term in Non-interest expense.

Finance leases
When we are the lessee in a finance lease, we initially record both the leased asset and the related lease obligation in Premises and equipment, Other intangibles and Other liabilities on our Consolidated Balance Sheets at an amount equal to the fair value of the leased asset or, if lower, the present value of the minimum lease payments, each determined at the date of inception of the lease. Initial direct costs directly attributed to the lease are recognized as an asset under the finance lease.

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, any gains (losses) on redemption of preferred shares 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. This includes certain convertible shares with the conversion assumed to have taken place at the beginning of the period or on the date of issue, if later. 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
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.

Future changes in accounting policy and disclosure
The following standards have been issued, but are not yet effective for us.

IFRS 16 *Leases* (IFRS 16)
In January 2016, the IASB issued IFRS 16, which sets out the principles for the recognition, measurement, presentation and disclosure of leases. The standard removes the current requirement for lessees to classify leases as finance leases or operating leases by introducing a single accounting model that requires the recognition of right-of-use assets and lease liabilities on the balance sheet for most leases. Lessees will recognize interest expense on the lease liability and depreciation expense on the right-of-use asset in the statement of income.

IFRS 16 will be effective for us on November 1, 2019. We will adopt IFRS 16 by adjusting our Consolidated Balance Sheet as at November 1, 2019, the date of initial application, with no restatement of comparative periods. On transition to IFRS 16, we intend to apply certain practical expedients, including the following:

- Election to not separate lease and non-lease components, to be applied to our real estate leases;

- Election to measure the right-of-use asset as if IFRS 16 had been applied since the commencement date of the lease, to be applied on a lease-by-lease basis to a select number of properties; and
- Exemption from recognition for short-term and low value leases.

Based on current estimates, the adoption of IFRS 16 as at November 1, 2019 is expected to result in increases to total assets and total liabilities of approximately $5 billion, primarily representing leases of premises and equipment previously classified as operating leases, and a reduction to retained earnings of approximately $0.1 billion, net of taxes. The adoption of IFRS 16 is also expected to decrease our CET1 capital ratio by approximately 14 bps.

IFRS Interpretations Committee Interpretation 23 *Uncertainty over income tax treatments* (IFRIC 23)
In June 2017, the IASB issued IFRIC 23, which provides guidance on the recognition and measurement of tax assets and liabilities under IAS 12 *Income taxes* when there is uncertainty over income tax treatments. IFRIC 23 will be effective for us on November 1, 2019. We do not expect the adoption of this interpretation to impact our consolidated financial statements.

Interest Rate Benchmark Reform
In September 2019, the IASB issued amendments to IFRS 9 *Financial Instruments*, IAS 39 *Financial Instruments: Recognition and Measurement* and IFRS 7 *Financial Instruments: Disclosures* (Amendments) which modify certain hedge accounting requirements to provide relief from the potential effect of uncertainty caused by the Interest Rate Benchmark Reform, prior to the transition to alternative interest rates. The Amendments will be effective for us on November 1, 2020, with earlier adoption permitted. To manage our transition to alternative interest rates, we have implemented a comprehensive enterprise-wide program and governance structure that focuses on key areas of impact including contract changes with clients, capital and liquidity planning, financial reporting and valuation, systems, processes, education and communication.

We are currently assessing the impact of adoption on our Consolidated Financial Statements.

Conceptual Framework for Financial Reporting (Conceptual Framework)
In March 2018, the IASB issued its revised Conceptual Framework. This replaces the previous version of the Conceptual Framework issued in 2010. The revised Conceptual Framework will be effective on November 1, 2020. We are currently assessing the impact of adoption on our Consolidated Financial Statements.

IFRS 17 Insurance Contracts (IFRS 17)
In May 2017, the IASB issued IFRS 17 to establish a comprehensive global 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. This new standard will be effective for us on November 1, 2021 and will be applied retrospectively with restatement of comparatives unless impracticable. In June 2019, the IASB issued an exposure draft to amend IFRS 17, including deferral of the effective date by one year. We will continue to monitor the IASB's developments. We are currently assessing the impact of adopting this standard and the proposed amendments on our Consolidated Financial Statements.

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, 2019							
	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	$ –	$ 22,283	$ –	$ –	$ 16,062	$ 16,062	$ 38,345	$ 38,345
Securities								
Trading	137,600	8,934	–	–	–	–	146,534	146,534
Investment, net of applicable allowance	–	–	57,223	463	44,784	45,104	102,470	102,790
	137,600	8,934	57,223	463	44,784	45,104	249,004	249,324
Assets purchased under reverse repurchase agreements and securities borrowed	246,068	–	–	–	60,893	60,894	306,961	306,962
Loans, net of applicable allowance								
Retail	275	242	95	–	423,469	424,416	424,081	425,028
Wholesale	7,055	1,856	451	–	185,413	184,645	194,775	194,007
	7,330	2,098	546	–	608,882	609,061	618,856	619,035
Other								
Derivatives	101,560	–	–	–	–	–	101,560	101,560
Other assets (1)	3,156	–	–	–	50,375	50,375	53,531	53,531
Financial liabilities								
Deposits								
Personal	$ 140	$ 17,394			$ 277,198	$ 277,353	$294,732	$294,887
Business and government (2)	151	111,389			453,942	452,536	565,482	564,076
Bank (3)	–	3,032			22,759	22,773	25,791	25,805
	291	131,815			753,899	752,662	886,005	884,768
Other								
Obligations related to securities sold short	35,069	–			–	–	35,069	35,069
Obligations related to assets sold under repurchase agreements and securities loaned	–	218,612			7,974	7,974	226,586	226,586
Derivatives	98,543	–			–	–	98,543	98,543
Other liabilities (4)	(1,209)	91			61,039	61,024	59,921	59,906
Subordinated debentures	–	–			9,815	9,930	9,815	9,930

(Millions of Canadian dollars)	As at October 31, 2018							
	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	$ –	$ 20,274	$ –	$ –	$ 16,197	$ 16,197	$ 36,471	$ 36,471
Securities								
Trading	121,031	7,227	–	–	–	–	128,258	128,258
Investment, net of applicable allowance	–	–	48,093	406	46,109	45,367	94,608	93,866
	121,031	7,227	48,093	406	46,109	45,367	222,866	222,124
Assets purchased under reverse repurchase agreements and securities borrowed	219,108	–	–	–	75,494	75,490	294,602	294,598
Loans, net of applicable allowance								
Retail	69	190	94	–	397,102	394,051	397,455	394,404
Wholesale	7,129	1,540	458	–	170,236	168,087	179,363	177,214
	7,198	1,730	552	–	567,338	562,138	576,818	571,618
Other								
Derivatives	94,039	–	–	–	–	–	94,039	94,039
Other assets (1)	1,373	–	–	–	46,205	46,205	47,578	47,578
Financial liabilities								
Deposits								
Personal	$ 150	$ 14,602			$ 255,402	$ 255,115	$ 270,154	$ 269,867
Business and government (2), (3)	(11)	102,597			430,936	431,158	533,522	533,744
Bank (4)	–	7,072			25,449	25,462	32,521	32,534
	139	124,271			711,787	711,735	836,197	836,145
Other								
Obligations related to securities sold short	32,247	–			–	–	32,247	32,247
Obligations related to assets sold under repurchase agreements and securities loaned	–	201,839			4,975	4,976	206,814	206,815
Derivatives	90,238	–			–	–	90,238	90,238
Other liabilities (3), (5)	(1,434)	18			55,766	55,729	54,350	54,313
Subordinated debentures	–	–			9,131	9,319	9,131	9,319

(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) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Amounts have been reclassified to conform with this presentation.
(4) Bank deposits refer to deposits from regulated banks and central banks.
(5) 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 years ended October 31, 2019 and October 31, 2018, there were no significant changes in the fair value of the loans and receivables designated as FVTPL attributable to changes in credit risk. As at October 31, 2019, the extent to which credit derivatives or similar instruments mitigate the maximum exposure to credit risk was $514 million (October 31, 2018 – $nil).

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, 2019 (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	$ 17,307	$ 17,394	$ 87	$ 3	$ 22
Business and government (3)	110,763	111,389	626	(76)	210
Bank (4)	3,031	3,032	1	–	–
	131,101	131,815	714	(73)	232
Obligations related to assets sold under repurchase agreements and securities loaned	218,604	218,612	8	–	–
Other liabilities	91	91	–	–	–
	$ 349,796	$ 350,518	$ 722	$ (73)	$ 232

(Millions of Canadian dollars)	As at or for the year ended October 31, 2018 (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	$ 14,726	$ 14,602	$ (124)	$ (41)	$ 19
Business and government (3), (5)	102,640	102,597	(43)	(134)	285
Bank (4)	7,067	7,072	5	–	–
	124,433	124,271	(162)	(175)	304
Obligations related to assets sold under repurchase agreements and securities loaned	201,924	201,839	(85)	–	–
Other liabilities	18	18	–	–	–
	$ 326,375	$ 326,128	$ (247)	$ (175)	$ 304

(1) There are no changes in fair value attributable to changes in credit risk included in net income for positions still held.
(2) The cumulative change is measured from the initial designation of the liabilities as FVTPL. For the year ended October 31, 2019, $4 million of fair value losses previously included in OCI relate to financial liabilities derecognized during the year (October 31, 2018 – $7 million 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.
(5) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Amounts have been reclassified to conform with this presentation.

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 2019	October 31 2018
Net gains (losses) (1)		
Classified as fair value through profit or loss (2)	**$ 3,564**	$ (265)
Designated as fair value through profit or loss (3), (4)	**(1,821)**	2,067
	$ 1,743	$ 1,802
By product line (1)		
Interest rate and credit (4), (5)	**$ 1,534**	$ 1,535
Equities	**(144)**	(164)
Foreign exchange and commodities	**353**	431
	$ 1,743	$ 1,802

(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 gains from financial instruments designated as FVTPL of $1,303 million (October 31, 2018 – losses of $400 million).
(2) Excludes derivatives designated in a hedging relationship. Refer to Note 8 for net gains (losses) on these derivatives.
(3) For the year ended October 31, 2019, $1,810 million of net fair value losses 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, 2018 – gains of $2,052 million).
(4) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.
(5) 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 2019	October 31 2018 (1)
Interest and dividend income (2), (3)		
Financial instruments measured at fair value through profit or loss (4)	**$ 12,103**	$ 7,800
Financial instruments measured at fair value through other comprehensive income	**1,132**	802
Financial instruments measured at amortized cost	**28,098**	24,419
	41,333	33,021
Interest expense (2)		
Financial instruments measured at fair value through profit or loss (4)	**$ 10,507**	$ 6,542
Financial instruments measured at amortized cost	**11,077**	8,527
	21,584	15,069
Net interest income	**$ 19,749**	$ 17,952

(1) Amounts have been revised from those previously presented.
(2) 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 $486 million (October 31, 2018 – $479 million), and Interest expense of $4 million (October 31, 2018 – $4 million).
(3) Includes dividend income for the year ended October 31, 2019 of $2,057 million (October 31, 2018 – $1,561 million), which is presented in Interest and dividend income in the Consolidated Statements of Income.
(4) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.

Fee income arising from financial instruments

For the year ended October 31, 2019, we earned $5,270 million in fees from banking services (October 31, 2018 – $5,426 million). For the year ended October 31, 2019, we also earned $12,117 million in fees from investment management, trust, custodial, underwriting, brokerage and other similar fiduciary services to retail and institutional clients (October 31, 2018 – $11,944 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, 2019					October 31, 2018				
	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	$ –	$ 22,283	$ –	$	$ 22,283	$ –	$ 20,274	$ –	$	$ 20,274
Securities										
Trading										
Debt issued or guaranteed by:										
Canadian government (1)										
Federal	14,655	5,474	–		20,129	8,342	6,231	–		14,573
Provincial and municipal	–	11,282	–		11,282	–	11,350	–		11,350
U.S. state, municipal and agencies (1)	2,050	39,584	58		41,692	2,068	31,030	66		33,164
Other OECD government (2)	2,786	3,710	–		6,496	1,151	9,018	–		10,169
Mortgage-backed securities (1)	–	482	–		482	–	1,001	–		1,001
Asset-backed securities										
Non-CDO securities (3)	–	1,333	2		1,335	–	1,023	110		1,133
Corporate debt and other debt	1	23,643	21		23,665	2	22,303	21		22,326
Equities	38,309	1,925	1,219		41,453	30,847	2,547	1,148		34,542
	57,801	87,433	1,300		146,534	42,410	84,503	1,345		128,258
Investment										
Debt issued or guaranteed by:										
Canadian government (1)										
Federal	–	657	–		657	–	238	–		238
Provincial and municipal	–	2,898	–		2,898	–	1,554	–		1,554
U.S. state, municipal and agencies (1)	210	20,666	–		20,876	–	18,136	–		18,136
Other OECD government	–	4,251	–		4,251	–	1,470	–		1,470
Mortgage-backed securities (1)	–	2,675	27		2,702	–	2,174	–		2,174
Asset-backed securities										
CDO	–	7,300	–		7,300	–	6,239	–		6,239
Non-CDO securities	–	849	–		849	–	863	–		863
Corporate debt and other debt	–	17,537	153		17,690	–	17,227	192		17,419
Equities	42	127	294		463	42	127	237		406
	252	56,960	474		57,686	42	48,028	429		48,499
Assets purchased under reverse repurchase agreements and securities borrowed	–	246,068	–		246,068	–	219,108	–		219,108
Loans	–	9,294	680		9,974	–	8,929	551		9,480
Other										
Derivatives										
Interest rate contracts	1	46,095	349		46,445	1	33,862	222		34,085
Foreign exchange contracts	–	40,768	48		40,816	–	43,253	53		43,306
Credit derivatives	–	169	–		169	–	38	–		38
Other contracts	2,852	12,674	11		15,537	5,868	11,654	296		17,818
Valuation adjustments	–	(712)	15		(697)	–	(631)	6		(625)
Total gross derivatives	2,853	98,994	423		102,270	5,869	88,176	577		94,622
Netting adjustments				(710)	(710)				(583)	(583)
Total derivatives					101,560					94,039
Other assets	1,119	1,960	77		3,156	1,020	288	65		1,373
	$62,025	$522,992	$ 2,954	$ (710)	$ 587,261	$ 49,341	$ 469,306	$ 2,967	$ (583)	$ 521,031
Financial liabilities										
Deposits										
Personal	$ –	$ 17,378	$ 156	$	$ 17,534	$ –	$ 14,362	$ 390	$	$ 14,752
Business and government (4)	–	111,540	–		111,540	–	102,591	(5)		102,586
Bank	–	3,032	–		3,032	–	7,072	–		7,072
Other										
Obligations related to securities sold short	20,512	14,557	–		35,069	17,732	14,515	–		32,247
Obligations related to assets sold under repurchase agreements and securities loaned	–	218,612	–		218,612	–	201,839	–		201,839
Derivatives										
Interest rate contracts	–	39,165	934		40,099	–	29,620	726		30,346
Foreign exchange contracts	–	40,183	27		40,210	–	41,836	32		41,868
Credit derivatives	–	282	–		282	–	94	–		94
Other contracts	2,675	15,776	206		18,657	4,369	13,730	380		18,479
Valuation adjustments	–	12	(7)		5	–	29	5		34
Total gross derivatives	2,675	95,418	1,160		99,253	4,369	85,309	1,143		90,821
Netting adjustments				(710)	(710)				(583)	(583)
Total derivatives					98,543					90,238
Other liabilities	102	(1,280)	60		(1,118)	170	(1,654)	68		(1,416)
	$23,289	$459,257	$ 1,376	$ (710)	$ 483,212	$ 22,271	$ 424,034	$ 1,596	$ (583)	$ 447,318

(1) As at October 31, 2019, residential and commercial mortgage-backed securities (MBS) included in all fair value levels of trading securities were $22,365 million and $nil (October 31, 2018 – $16,776 million and $nil), respectively, and in all fair value levels of Investment securities were $6,474 million and $2,046 million (October 31, 2018 – $4,713 million and $1,348 million), respectively.
(2) OECD stands for Organisation for Economic Co-operation and Development.
(3) CDO stands for collateralized debt obligations.
(4) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

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. 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. 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 (Canadian Dealer Offered Rate, LIBOR 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. 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 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, 2019 (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
Non-derivative financial instruments								
Auction rate securities				Discounted cash flows	Discount margins	1.60%	3.00%	1.65%
	U.S. state, municipal and agencies debt	58			Default rates	3.00%	3.00%	3.00%
	Asset-backed securities	2			Prepayment rates	8.00%	8.00%	8.00%
					Recovery rates	96.50%	96.50%	96.50%
Corporate debt				Price-based	Prices	$ 20.00	$131.78	$ 110.30
	Corporate debt and other debt	24		Discounted cash flows	Credit spread	1.02%	11.34%	6.18%
	Loans	680			Credit enhancement	11.82%	15.75%	13.13%
Government debt and municipal bonds				Price-based	Prices	$ 65.50	$100.00	$ 65.67
	U.S. state, municipal and agencies debt	–		Discounted cash flows	Yields	4.70%	6.63%	5.80%
	Mortgage-backed securities	27						
	Corporate debt and other debt	150						
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	4.00X	24.90X	10.23X
	Equities	1,513		Price-based	P/E multiples	9.70X	29.90X	16.11X
	Derivative related liabilities		10	Discounted cash flows	EV/Rev multiples	0.90X	5.93X	3.55X
					Liquidity discounts (4)	10.00%	40.00%	17.64%
					Discount rate	10.00%	12.00%	10.45%
					NAV / prices (5)	n.a.	n.a.	n.a.
Derivative financial instruments (6)								
Interest rate derivatives and interest-rate-linked structured notes (7)	Derivative related assets	380		Discounted cash flows	Interest rates	1.27%	2.16%	Even
	Derivative related liabilities		943	Option pricing model	CPI swap rates	1.40%	2.00%	Even
					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 (7)				Discounted cash flows	Dividend yields	0.10%	8.77%	Lower
	Derivative related assets	11		Option pricing model	Equity (EQ)-EQ correlations	34.00%	95.40%	Middle
	Deposits		156		EQ-FX correlations	(71.40)%	30.50%	Middle
	Derivative related liabilities		180		EQ volatilities	4.00%	110.00%	Upper
Other (8)								
	Derivative related assets	32						
	Other assets	77						
	Deposits		–					
	Derivative related liabilities		27					
	Other liabilities		60					
Total		$ 2,954	$ 1,376					

As at October 31, 2018 (Millions of Canadian dollars, except for prices, percentages and ratios)

Products	Reporting line in the fair value hierarchy table	Fair value: Assets	Fair value: Liabilities	Valuation techniques	Significant unobservable inputs (3)	Range of input values (1), (2): Low	Range of input values (1), (2): High	Range of input values (1), (2): Weighted average / Inputs distribution
Non-derivative financial instruments								
Auction rate securities				Discounted cash flows	Discount margins	1.32%	2.70%	1.95%
	U.S. state, municipal and agencies debt	45			Default rates	3.00%	3.00%	3.00%
	Asset-backed securities	110			Prepayment rates	4.00%	5.50%	4.56%
					Recovery rates	96.50%	97.50%	96.59%
Corporate debt				Price-based	Prices	$ 72.00	$ 123.06	$ 103.84
	Corporate debt and other debt	28		Discounted cash flows	Credit spread	0.90%	11.30%	4.50%
	Loans	551			Credit enhancement	11.80%	15.80%	13.10%
Government debt and municipal bonds				Price-based	Prices	$ 65.50	$ 100.00	$ 66.41
	U.S. state, municipal and agencies debt	21		Discounted cash flows	Yields	3.50%	7.60%	5.75%
	Mortgage-backed securities	–						
	Corporate debt and other debt	185						
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	6.16X	17.80X	14.46X
	Equities	1,385		Price-based	P/E multiples	9.10X	26.41X	18.26X
	Derivative related liabilities		24	Discounted cash flows	EV/Rev multiples	0.90X	6.63X	4.86X
					Liquidity discounts (4)	10.00%	40.00%	18.27%
					Discount rate	10.52%	10.52%	10.52%
					NAV / prices (5)	n.a.	n.a.	n.a.
Derivative financial instruments (6)								
Interest rate derivatives and interest-rate-linked structured notes (7)	Derivative related assets	260		Discounted cash flows	Interest rates	2.30%	3.00%	Even
	Derivative related liabilities		740	Option pricing model	CPI swap rates	1.90%	2.10%	Even
					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 (7)				Discounted cash flows	Dividend yields	0.30%	8.40%	Lower
	Derivative related assets	281		Option pricing model	Equity (EQ)-EQ correlations	(55.00)%	100.00%	Middle
	Deposits		390		EQ-FX correlations	(71.40)%	30.50%	Middle
	Derivative related liabilities		328		EQ volatilities	8.00%	164.00%	Upper
Other (8)								
	Derivative related assets	36						
	Other assets	65						
	Deposits		(5)					
	Derivative related liabilities		51					
	Other liabilities		68					
Total		$ 2,967	$ 1,596					

(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 or pre-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 acronyms stand for 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 $255 million (October 31, 2018 – $207 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 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.

Changes in fair value measurement for instruments measured on a recurring basis and categorized in Level 3

(Millions of Canadian dollars)	For the year ended October 31, 2019								
	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
Assets									
Securities									
Trading									
Debt issued or guaranteed by:									
U.S. state, municipal and agencies	$ 66	$ –	$ 1	$ –	$ (9)	$ –	$ –	$ 58	$ –
Asset-backed securities									
Non-CDO securities	110	15	–	–	(123)	–	–	2	3
Corporate debt and other debt	21	1	1	–	(2)	–	–	21	1
Equities	1,148	(76)	2	333	(226)	39	(1)	1,219	(20)
	1,345	(60)	4	333	(360)	39	(1)	1,300	(16)
Investment									
Mortgage-backed securities	–	–	–	27	–	–	–	27	n.a.
Corporate debt and other debt	192	(3)	24	–	(60)	–	–	153	n.a.
Equities	237	–	16	5	36	–	–	294	n.a.
	429	(3)	40	32	(24)	–	–	474	n.a.
Loans	551	40	2	830	(481)	55	(317)	680	19
Other									
Net derivative balances (3)									
Interest rate contracts	(504)	(79)	–	(197)	217	(7)	(15)	(585)	(42)
Foreign exchange contracts	21	12	–	–	(6)	4	(10)	21	32
Other contracts	(84)	131	2	(131)	18	(38)	(93)	(195)	115
Valuation adjustments	1	–	–	–	21	–	–	22	–
Other assets	65	28	–	–	(16)	–	–	77	27
	$ 1,824	$ 69	$ 48	$ 867	$ (631)	$ 53	$ (436)	$ 1,794	$ 135
Liabilities									
Deposits									
Personal	$ (390)	$ (38)	$ –	$ (102)	$ 29	$ (214)	$ 559	$ (156)	$ –
Business and government	5	–	–	–	–	–	(5)	–	–
Other									
Other liabilities	(68)	(16)	(1)	1	24	–	–	(60)	(12)
	$ (453)	$ (54)	$ (1)	$ (101)	$ 53	$ (214)	$ 554	$ (216)	$ (12)

(Millions of Canadian dollars)	For the year ended October 31, 2018								
	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
Assets									
Securities									
Trading									
Debt issued or guaranteed by:									
U.S. state, municipal and agencies	$ 508	$ 16	$ (3)	$ –	$ (455)	$ –	$ –	$ 66	$ (1)
Asset-backed securities									
Non-CDO securities	196	28	2	–	(116)	–	–	110	1
Corporate debt and other debt	30	(2)	–	–	(2)	–	(5)	21	(1)
Equities	923	(160)	37	395	(170)	125	(2)	1,148	(24)
	1,657	(118)	36	395	(743)	125	(7)	1,345	(25)
Investment									
Mortgage-backed securities	–	–	–	–	–	–	–	–	n.a.
Corporate debt and other debt	29	(30)	6	125	(144)	206	–	192	n.a.
Equities	220	–	20	–	(3)	–	–	237	n.a.
	249	(30)	26	125	(147)	206	–	429	n.a.
Loans	477	(3)	(3)	450	(291)	16	(95)	551	14
Other									
Net derivative balances (3)									
Interest rate contracts	(455)	21	–	67	73	7	(217)	(504)	(3)
Foreign exchange contracts	21	(10)	(4)	11	2	5	(4)	21	(5)
Other contracts	(181)	34	(2)	(88)	(42)	(36)	231	(84)	79
Valuation adjustments	(16)	–	–	–	17	–	–	1	–
Other assets	–	(5)	–	71	(1)	–	–	65	(5)
	$ 1,752	$ (111)	$ 53	$ 1,031	$ (1,132)	$ 323	$ (92)	$ 1,824	$ 55
Liabilities									
Deposits									
Personal	$ (465)	$ (36)	$ (4)	$ (301)	$ 44	$ (431)	$ 803	$ (390)	$ (8)
Business and government	–	–	–	5	–	–	–	5	–
Other									
Other liabilities	(24)	–	(1)	(53)	10	–	–	(68)	4
	$ (489)	$ (36)	$ (5)	$ (349)	$ 54	$ (431)	$ 803	$ (453)	$ (4)

(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 $43 million for the year ended October 31, 2019 (October 31, 2018 – gains of $33 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, 2019 included derivative assets of $423 million (October 31, 2018 – $577 million) and derivative liabilities of $1,160 million (October 31, 2018 – $1,143 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 Total realized/unrealized gains (losses) included in earnings 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, 2019, transfers out of Level 1 to Level 2 included Other contracts, consisting of derivative related assets and derivative related liabilities of $1,996 million and $621 million, respectively and Trading U.S. state, municipal and agencies debt of $1,250 million and Obligations related to securities sold short of $202 million. During the year ended October 31, 2018, transfers out of Level 1 to Level 2 included $529 million of Trading U.S. state, municipal and agencies debt and $809 million of Obligations related to securities sold short.

During the year ended October 31, 2019, there were no significant transfers out of Level 2 to Level 1. During the year ended October 31, 2018, transfers out of Level 2 to Level 1 included $65 million of Trading U.S. state, municipal and agencies debt and $96 million of Obligations related to securities sold short.

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, 2019, significant transfers out of Level 2 to Level 3 included $214 million of Personal deposits, due to changes in the significance of unobservable inputs.

During the year ended October 31, 2018, significant transfers out of Level 2 to Level 3 included $125 million of Trading Equities, $206 million of Corporate debt and other debt and $431 million of Personal deposits.

During the year ended October 31, 2019, significant transfers out of Level 3 to Level 2 included:

- $317 million of Loans, due to changes in the significance of unobservable inputs.
- $86 million of OTC equity options in Other contracts comprised of $459 million of derivative related assets and $373 million of derivative related liabilities, due to changes in the market observability of inputs.
- $559 million of Personal deposits, due to changes in the significance of unobservable inputs.

During the year ended October 31, 2018, significant transfers out of Level 3 to Level 2 included:

- $217 million of interest rate swaps in Interest rate contracts comprised of $244 million of derivative related assets and $27 million of derivative related liabilities.
- $231 million of OTC equity options in Other contracts comprised of $703 million of derivative related assets and $934 million of derivative related liabilities.
- $803 million of Personal deposits.

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.

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, 2019			October 31, 2018		
(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	**$ 58**	**$ 1**	**$ (1)**	$ 66	$ –	$ (1)
Asset-backed securities	**2**	**–**	**–**	110	7	(10)
Corporate debt and other debt	**21**	**–**	**–**	21	–	–
Equities	**1,219**	**13**	**(14)**	1,148	12	(12)
Investment						
Mortgage-backed securities	**27**	**1**	**(1)**	–	–	–
Corporate debt and other debt	**153**	**15**	**(13)**	192	19	(16)
Equities	**294**	**26**	**(27)**	237	24	(26)
Loans	**680**	**9**	**(12)**	551	5	(7)
Derivatives	**423**	**6**	**(3)**	577	20	(18)
Other assets	**77**	**–**	**–**	65	–	–
	$ 2,954	**$ 71**	**$ (71)**	$ 2,967	$ 87	$ (90)
Deposits	**$ (156)**	**$ 4**	**$ (4)**	$ (385)	$ 12	$ (11)
Derivatives	**(1,160)**	**20**	**(17)**	(1,143)	47	(54)
Other						
Other liabilities	**(60)**	**–**	**–**	(68)	–	–
	$ (1,376)	**$ 24**	**$ (21)**	$ (1,596)	$ 59	$ (65)

Sensitivity results

As at October 31, 2019, the effects of applying other reasonably possible alternative assumptions to the Level 3 asset positions would be an increase of $71 million and a decrease of $71 million in fair value, of which $43 million and $42 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 $24 million and an increase of $21 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.
Auction rate securities	Sensitivity of ARS is determined by decreasing the discount margin between 13% and 17% and increasing the discount margin between 27% and 31%, depending on the specific reasonable range of fair value uncertainty for each particular financial instrument's market. Changes to the discount margin reflect historical monthly movements in the student loan ABS market.
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, 2019					
		Fair value may not approximate carrying value				
		Fair value measurements using				
(Millions of Canadian dollars)	Fair value always approximates carrying value (1)	Level 1	Level 2	Level 3	Total	Total fair value
Interest-bearing deposits with banks	$ 16,062	$ –	$ –	$ –	$ –	$ 16,062
Amortized cost securities (2)	–	523	44,581	–	45,104	45,104
Assets purchased under reverse repurchase agreements and securities borrowed	48,784	–	12,110	–	12,110	60,894
Loans						
Retail	66,647	–	352,717	5,052	357,769	424,416
Wholesale	6,596	–	173,274	4,775	178,049	184,645
	73,243	–	525,991	9,827	535,818	609,061
Other assets	49,761	–	469	145	614	50,375
	187,850	523	583,151	9,972	593,646	781,496
Deposits						
Personal	195,583	–	81,179	591	81,770	277,353
Business and government	296,166	–	155,646	724	156,370	452,536
Bank	15,093	–	7,671	9	7,680	22,773
	506,842	–	244,496	1,324	245,820	752,662
Obligations related to assets sold under repurchase agreements and securities loaned	7,974	–	–	–	–	7,974
Other liabilities	50,601	–	445	9,978	10,423	61,024
Subordinated debentures	8	–	9,864	58	9,922	9,930
	$ 565,425	$ –	$ 254,805	$ 11,360	$ 266,165	$ 831,590

(Millions of Canadian dollars)	As at October 31, 2018					
	Fair value always approximates carrying value (1)	Fair value may not approximate carrying value				
		Fair value measurements using				
		Level 1	Level 2	Level 3	Total	Total fair value
Interest-bearing deposits with banks	$ 16,197	$ –	$ –	$ –	$ –	$ 16,197
Amortized cost securities (2)	–	470	44,897	–	45,367	45,367
Assets purchased under reverse repurchase agreements and securities borrowed	57,099	–	18,391	–	18,391	75,490
Loans						
Retail	65,847	–	323,114	5,090	328,204	394,051
Wholesale	8,889	–	154,781	4,417	159,198	168,087
	74,736	–	477,895	9,507	487,402	562,138
Other assets	45,559	–	480	166	646	46,205
	193,591	470	541,663	9,673	551,806	745,397
Deposits						
Personal	184,887	–	69,606	622	70,228	255,115
Business and government	270,349	–	160,010	799	160,809	431,158
Bank	15,218	–	10,235	9	10,244	25,462
	470,454	–	239,851	1,430	241,281	711,735
Obligations related to assets sold under repurchase agreements and securities loaned	4,264	–	712	–	712	4,976
Other liabilities (3)	46,195	–	406	9,128	9,534	55,729
Subordinated debentures	–	–	9,260	59	9,319	9,319
	$ 520,913	$ –	$ 250,229	$ 10,617	$ 260,846	$ 781,759

(1) Certain financial instruments have not been assigned to a level as the carrying amount always approximates their fair values due to their short-term nature (instruments that are receivable or payable on demand, or with original maturity of three months or less) and insignificant credit risk.
(2) Included in Securities – Investment, net of applicable allowance on the Consolidated Balance Sheets.
(3) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Amounts have been reclassified to conform with this presentation.

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.

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 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)	As at October 31, 2019						
	Term to maturity (1)					With no specific maturity	Total
	Within 3 months	3 months to 1 year	1 year to 5 years	5 years to 10 years	Over 10 years		
Trading (2)							
Debt issued or guaranteed by:							
Canadian government	$ 1,974	$ 11,265	$ 7,783	$ 1,778	$ 8,611	$ –	$ 31,411
U.S. state, municipal and agencies	771	7,122	8,601	9,537	15,661	–	41,692
Other OECD government	538	1,418	2,211	1,466	863	–	6,496
Mortgage-backed securities	–	–	–	–	482	–	482
Asset-backed securities	359	63	308	267	338	–	1,335
Corporate debt and other debt							
Bankers' acceptances	433	–	–	–	–	–	433
Certificates of deposit	586	383	75	20	6	–	1,070
Other (3)	1,369	2,773	8,268	2,827	6,925	–	22,162
Equities	–	–	–	–	–	41,453	41,453
	6,030	23,024	27,246	15,895	32,886	41,453	146,534
Fair value through other comprehensive income (2)							
Debt issued or guaranteed by:							
Canadian government							
Federal							
Amortized cost	–	5	596	–	54	–	655
Fair value	–	5	595	–	57	–	657
Yield (4)	–	1.1%	1.4%	–	4.2%	–	1.7%
Provincial and municipal							
Amortized cost	–	4	954	13	1,907	–	2,878
Fair value	–	4	953	14	1,927	–	2,898
Yield (4)	–	4.8%	2.7%	4.5%	2.8%	–	2.8%
U.S. state, municipal and agencies							
Amortized cost	1,597	1,085	3,290	829	13,986	–	20,787
Fair value	1,598	1,087	3,294	844	14,053	–	20,876
Yield (4)	2.1%	1.8%	2.0%	2.9%	2.7%	–	2.5%
Other OECD government							
Amortized cost	236	178	3,839	1	–	–	4,254
Fair value	236	178	3,836	1	–	–	4,251
Yield (4)	1.2%	2.1%	2.4%	3.8%	–	–	2.3%
Mortgage-backed securities							
Amortized cost	–	–	–	206	2,503	–	2,709
Fair value	–	–	–	205	2,497	–	2,702
Yield (4)	–	–	–	3.0%	2.7%	–	2.7%
Asset-backed securities							
Amortized cost	1	–	8	3,982	4,190	–	8,181
Fair value	–	–	8	3,972	4,169	–	8,149
Yield (4)	0.0%	–	3.2%	3.2%	3.1%	–	3.2%
Corporate debt and other debt							
Amortized cost	1,564	3,222	12,668	79	122	–	17,655
Fair value	1,565	3,225	12,673	89	138	–	17,690
Yield (4)	1.4%	1.9%	2.0%	2.0%	3.1%	–	1.9%
Equities							
Cost	–	–	–	–	–	248	248
Fair value (5)	–	–	–	–	–	463	463
Amortized cost	3,398	4,494	21,355	5,110	22,762	248	57,367
Fair value	3,399	4,499	21,359	5,125	22,841	463	57,686
Amortized Cost (2)							
Debt issued or guaranteed by:							
Canadian government	682	1,978	9,831	1,515	–	–	14,006
U.S. state, municipal and agencies	297	478	1,680	2,018	12,190	–	16,663
Other OECD government	2,252	1,431	1,634	–	–	–	5,317
Asset-backed securities	–	9	616	–	–	–	625
Corporate debt and other debt	400	1,853	5,717	145	58	–	8,173
Amortized cost, net of allowance	3,631	5,749	19,478	3,678	12,248	–	44,784
Fair value	3,631	5,822	19,628	3,746	12,277	–	45,104
Total carrying value of securities	$13,060	$ 33,272	$68,083	$ 24,698	$67,975	$41,916	$249,004

(Millions of Canadian dollars)	As at October 31, 2018						
	Term to maturity (1)					With no specific maturity	Total
	Within 3 months	3 months to 1 year	1 year to 5 years	5 years to 10 years	Over 10 years		
Trading (2)							
Debt issued or guaranteed by:							
Canadian government	$ 1,860	$ 7,237	$ 7,983	$ 2,244	$ 6,599	$ –	$ 25,923
U.S. state, municipal and agencies	595	3,715	9,836	5,119	13,899	–	33,164
Other OECD government	1,367	3,932	3,456	635	779	–	10,169
Mortgage-backed securities	–	–	114	93	794	–	1,001
Asset-backed securities	126	14	215	369	409	–	1,133
Corporate debt and other debt							
Bankers' acceptances	326	–	–	–	–	–	326
Certificates of deposit	300	84	48	3	25	–	460
Other (3)	2,120	4,058	6,720	3,099	5,543	–	21,540
Equities	–	–	–	–	–	34,542	34,542
	6,694	19,040	28,372	11,562	28,048	34,542	128,258
Fair value through other comprehensive income (2)							
Debt issued or guaranteed by:							
Canadian government							
Federal							
Amortized cost	–	–	173	15	56	–	244
Fair value	–	–	169	15	54	–	238
Yield (4)	–	–	1.7%	1.8%	4.5%	–	2.3%
Provincial and municipal							
Amortized cost	–	51	673	236	618	–	1,578
Fair value	–	51	672	234	597	–	1,554
Yield (4)	–	1.7%	2.9%	2.0%	4.0%	–	3.1%
U.S. state, municipal and agencies							
Amortized cost	1,355	132	2,766	635	13,112	–	18,000
Fair value	1,355	131	2,768	643	13,239	–	18,136
Yield (4)	2.4%	2.1%	2.3%	3.2%	3.0%	–	2.8%
Other OECD government							
Amortized cost	225	86	1,090	67	1	–	1,469
Fair value	225	86	1,091	67	1	–	1,470
Yield (4)	0.6%	2.4%	2.3%	1.4%	4.2%	–	2.0%
Mortgage-backed securities							
Amortized cost	–	–	59	193	1,924	–	2,176
Fair value	–	–	59	193	1,922	–	2,174
Yield (4)	–	–	1.6%	3.4%	2.9%	–	2.9%
Asset-backed securities							
Amortized cost	–	–	–	2,662	4,442	–	7,104
Fair value	–	–	–	2,657	4,445	–	7,102
Yield (4)	–	–	–	3.6%	3.4%	–	3.4%
Corporate debt and other debt							
Amortized cost	4,119	1,769	10,785	399	367	–	17,439
Fair value	4,120	1,772	10,783	390	354	–	17,419
Yield (4)	1.5%	1.8%	2.0%	3.0%	4.1%	–	1.9%
Equities							
Cost	–	–	–	–	–	222	222
Fair value (5)	–	–	–	–	–	406	406
Amortized cost	5,699	2,038	15,546	4,207	20,520	222	48,232
Fair value	5,700	2,040	15,542	4,199	20,612	406	48,499
Amortized Cost (2)							
Debt issued or guaranteed by:							
Canadian government	1,762	1,427	10,863	2,381	–	–	16,433
U.S. state, municipal and agencies	69	115	2,231	2,177	9,736	–	14,328
Other OECD government	2,601	1,386	2,800	–	–	–	6,787
Asset-backed securities	–	5	1,035	29	–	–	1,069
Corporate debt and other debt	253	1,434	5,566	161	78	–	7,492
Amortized cost, net of allowance	4,685	4,367	22,495	4,748	9,814	–	46,109
Fair value	4,687	4,360	22,286	4,635	9,399	–	45,367
Total carrying value of securities	$ 17,079	$ 25,447	$ 66,409	$ 20,509	$58,474	$ 34,948	$ 222,866

(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. During the year ended October 31, 2019, we disposed of $129 million of equity securities measured at FVOCI (October 31, 2018 – $8 million). The cumulative gain on the date of disposals was $1 million (October 31, 2018 – $(1) million).

Unrealized gains and losses on securities at FVOCI (1), (2)

(Millions of Canadian dollars)	As at October 31, 2019 Cost/ Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value	October 31, 2018 Cost/ Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Debt issued or guaranteed by:								
Canadian government								
Federal (3)	$ 655	$ 3	$ (1)	$ 657	$ 244	$ –	$ (6)	$ 238
Provincial and municipal	2,878	43	(23)	2,898	1,578	2	(26)	1,554
U.S. state, municipal and agencies (3)	20,787	215	(126)	20,876	18,000	285	(149)	18,136
Other OECD government	4,254	2	(5)	4,251	1,469	2	(1)	1,470
Mortgage-backed securities (3)	2,709	1	(8)	2,702	2,176	1	(3)	2,174
Asset-backed securities								
CDO	7,334	1	(35)	7,300	6,248	1	(10)	6,239
Non-CDO securities	847	4	(2)	849	856	9	(2)	863
Corporate debt and other debt	17,655	45	(10)	17,690	17,439	22	(42)	17,419
Equities	248	218	(3)	463	222	186	(2)	406
	$ 57,367	$ 532	$ (213)	$57,686	$ 48,232	$ 508	$ (241)	$48,499

(1) Excludes $44,784 million of held-to-collect securities as at October 31, 2019 that are carried at amortized cost, net of allowance for credit losses (October 31, 2018 – $46,109 million).
(2) Gross unrealized gains and losses includes $(3) million of allowance for credit losses on debt securities at FVOCI as at October 31, 2019 (October 31, 2018 – $11 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 $2,051 million, $1 million, $6 million and $2,046 million, respectively as at October 31, 2019 (October 31, 2018 – $1,442 million, $nil, $6 million and $1,436 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:

- 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, 2019 Performing Stage 1	Performing Stage 2	Impaired Stage 3 (2)	Total	October 31, 2018 Performing Stage 1	Performing Stage 2	Impaired Stage 3	Total
Balance at beginning of period	$ 4	$ 7	$ –	$ 11	$ 3	$ 22	$ –	$ 25
Provision for credit losses								
Transfers to stage 1	–	–	–	–	5	(5)	–	–
Transfers to stage 2	–	–	–	–	–	–	–	–
Transfers to stage 3	–	–	–	–	(36)	–	36	–
Purchases	5	–	–	5	85	–	–	85
Sales and maturities	(3)	(7)	–	(10)	(47)	(17)	25	(39)
Changes in risk, parameters and exposures	(2)	1	(8)	(9)	(8)	7	–	(1)
Write-offs	–	–	–	–	–	–	(62)	(62)
Exchange rate and other	–	(1)	1	–	2	–	1	3
Balance at end of period	$ 4	$ –	$ (7)	$ (3)	$ 4	$ 7	$ –	$ 11

(1) Expected credit losses on debt securities at FVOCI are not separately recognized on the balance sheet 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, 2019				October 31, 2018			
	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	$ 6	$ 32	$ –	$ 38	$ 9	$ 45	$ –	$ 54
Provision for credit losses								
Transfers to stage 1	–	–	–	–	3	(3)	–	–
Transfers to stage 2	–	–	–	–	(7)	7	–	–
Transfers to stage 3	–	–	–	–	–	(2)	2	–
Purchases	7	–	–	7	5	–	–	5
Sales and maturities	(1)	–	–	(1)	(3)	(11)	–	(14)
Changes in risk, parameters and exposures	(6)	(15)	–	(21)	(2)	(3)	–	(5)
Write-offs	–	–	–	–	–	–	(2)	(2)
Exchange rate and other	(1)	2	–	1	1	(1)	–	–
Balance at end of period	$ 5	$ 19	$ –	$ 24	$ 6	$ 32	$ –	$ 38

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, 2019				October 31, 2018			
	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	$ 56,671	$ 1	$ –	$ 56,672	$ 46,956	$ 479	$ –	$ 47,435
Non-investment grade	400	1	–	401	500	33	–	533
Impaired	–	–	150	150	–	–	125	125
	$ 57,071	$ 2	$ 150	$ 57,223	$ 47,456	$ 512	$ 125	$ 48,093
Items not subject to impairment (2)				463				406
				$ 57,686				$ 48,499
Securities at amortized cost								
Investment grade	$ 43,681	$ 46	$ –	$ 43,727	$ 44,958	$ 119	$ –	$ 45,077
Non-investment grade	695	386	–	1,081	367	703	–	1,070
Impaired	–	–	–	–	–	–	–	–
	$ 44,376	$ 432	$ –	$ 44,808	$ 45,325	$ 822	$ –	$ 46,147
Allowance for credit losses	5	19	–	24	6	32	–	38
Amortized cost	$ 44,371	$ 413	$ –	$ 44,784	$ 45,319	$ 790	$ –	$ 46,109

(1) Includes $150 million of purchased credit impaired securities (October 31, 2018 – $125 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

	As at October 31, 2019					
(Millions of Canadian dollars)	Canada	United States	Other International	Total	Allowance for losses (1)	Total net of allowance
Retail (2)						
Residential mortgages	$ 287,767	$ 17,012	$ 3,312	$ 308,091	$ (402)	$ 307,689
Personal	81,547	7,399	3,304	92,250	(762)	91,488
Credit cards (3)	19,617	439	255	20,311	(791)	19,520
Small business (4)	5,434	–	–	5,434	(50)	5,384
Wholesale (2), (5)	124,312	53,782	17,776	195,870	(1,095)	194,775
Total loans	$ 518,677	$ 78,632	$ 24,647	$ 621,956	$ (3,100)	$ 618,856
Undrawn loan commitments – Retail	208,336	5,063	801	214,200	(225)	
Undrawn loan commitments – Wholesale	101,017	176,022	54,982	332,021	(70)	

(Millions of Canadian dollars)	As at October 31, 2018					
	Canada	United States	Other International	Total	Allowance for losses (1)	Total net of allowance
Retail (2)						
Residential mortgages	$ 265,831	$ 13,493	$ 3,147	$ 282,471	$ (382)	$ 282,089
Personal	82,112	7,172	3,416	92,700	(841)	91,859
Credit cards (3)	18,793	368	254	19,415	(725)	18,690
Small business (4)	4,866	–	–	4,866	(49)	4,817
Wholesale (2), (5)	103,069	59,442	17,767	180,278	(915)	179,363
Total loans	$ 474,671	$ 80,475	$ 24,584	$ 579,730	$ (2,912)	$ 576,818
Undrawn loan commitments – Retail (6)	199,395	4,007	1,250	204,652	(90)	
Undrawn loan commitments – Wholesale (6)	96,146	169,910	53,797	319,853	(64)	

(1) Excludes allowance for loans measured at FVOCI of $nil (October 31, 2018 – $1 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.
(6) Amounts have been revised from those previously presented.

Loans maturity and rate sensitivity

(Millions of Canadian dollars)	As at October 31, 2019							
	Maturity term (1)				Rate sensitivity			
	Under 1 year (2)	1 to 5 years	Over 5 years	Total	Floating	Fixed Rate	Non-rate-sensitive	Total
Retail	**$ 216,610**	**$ 187,721**	**$ 21,755**	**$ 426,086**	**$ 114,736**	**$ 304,448**	**$ 6,902**	**$ 426,086**
Wholesale	**154,445**	**30,512**	**10,913**	**195,870**	**27,329**	**165,502**	**3,039**	**195,870**
Total loans	**$ 371,055**	**$ 218,233**	**$ 32,668**	**$ 621,956**	**$ 142,065**	**$ 469,950**	**$ 9,941**	**$ 621,956**
Allowance for loan losses				**(3,100)**				**(3,100)**
Total loans net of allowance for loan losses				**$ 618,856**				**$ 618,856**

(Millions of Canadian dollars)	As at October 31, 2018							
	Maturity term (1)				Rate sensitivity			
	Under 1 year (2)	1 to 5 years	Over 5 years	Total	Floating	Fixed Rate	Non-rate-sensitive	Total
Retail	$ 217,188	$ 163,291	$ 18,973	$ 399,452	$ 123,826	$ 268,793	$ 6,833	$ 399,452
Wholesale	144,208	27,789	8,281	180,278	31,016	147,970	1,292	180,278
Total loans	$ 361,396	$ 191,080	$ 27,254	$ 579,730	$ 154,842	$ 416,763	$ 8,125	$ 579,730
Allowance for loan losses				(2,912)				(2,912)
Total loans net of allowance for loan losses				$ 576,818				$ 576,818

(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.

Allowance for credit losses

(Millions of Canadian dollars)	For the year ended October 31, 2019 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, 2018 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	$ 382	$ 68	$ (37)	$ (11)	$ 402	$ 378	$ 47	$ (43)	$ –	$ 382
Personal	895	526	(474)	(12)	935	826	513	(431)	(13)	895
Credit cards	760	590	(518)	–	832	693	534	(468)	1	760
Small business	51	41	(28)	(3)	61	49	33	(28)	(3)	51
Wholesale	979	661	(397)	(78)	1,165	1,010	156	(142)	(45)	979
Customers' liability under acceptances	21	5	–	(2)	24	20	–	–	1	21
	$ 3,088	$ 1,891	$ (1,454)	$ (106)	$ 3,419	$ 2,976	$ 1,283	$ (1,112)	$ (59)	$ 3,088
Presented as:										
Allowance for loan losses	$ 2,912				$ 3,100	$ 2,749				$ 2,912
Other liabilities – Provisions	154				295	207				154
Customers' liability under acceptances	21				24	20				21
Other components of equity	1				–	–				1

(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, 2019 that are no longer subject to enforcement activity was $179 million (October 31, 2018 – $83 million).

The following table reconciles the opening and closing allowance for loans and commitments, by stage, for each major product category.

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.

Allowance for credit losses – Retail and Wholesale loans

	For the year ended							
	October 31, 2019				October 31, 2018			
	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	$ 142	$ 64	$ 176	$ 382	$ 140	$ 65	$ 173	$ 378
Provision for credit losses								
Model changes	–	–	–	–	20	2	4	26
Transfers to stage 1	87	(66)	(21)	–	59	(59)	–	–
Transfers to stage 2	(13)	16	(3)	–	(18)	23	(5)	–
Transfers to stage 3	(3)	(31)	34	–	(2)	(16)	18	–
Originations	51	–	–	51	63	1	–	64
Maturities	(14)	(10)	–	(24)	(13)	(10)	–	(23)
Changes in risk, parameters and exposures	(104)	104	41	41	(110)	56	34	(20)
Write-offs	–	–	(45)	(45)	–	–	(51)	(51)
Recoveries	–	–	8	8	–	–	8	8
Exchange rate and other	–	–	(11)	(11)	3	2	(5)	–
Balance at end of period	$ 146	$ 77	$ 179	$ 402	$ 142	$ 64	$ 176	$ 382
Personal								
Balance at beginning of period	$ 242	$ 512	$ 141	$ 895	$ 278	$ 427	$ 121	$ 826
Provision for credit losses								
Model changes	23	(48)	–	(25)	(10)	1	(6)	(15)
Transfers to stage 1	544	(537)	(7)	–	712	(712)	–	–
Transfers to stage 2	(87)	88	(1)	–	(140)	141	(1)	–
Transfers to stage 3	(2)	(142)	144	–	(3)	(157)	160	–
Originations	101	1	–	102	107	5	–	112
Maturities	(31)	(112)	–	(143)	(33)	(130)	–	(163)
Changes in risk, parameters and exposures	(517)	758	351	592	(668)	938	309	579
Write-offs	–	–	(600)	(600)	–	–	(552)	(552)
Recoveries	–	–	126	126	–	–	121	121
Exchange rate and other	(1)	–	(11)	(12)	(1)	(1)	(11)	(13)
Balance at end of period	$ 272	$ 520	$ 143	$ 935	$ 242	$ 512	$ 141	$ 895
Credit cards								
Balance at beginning of period	$ 161	$ 599	$ –	$ 760	$ 251	$ 442	$ –	$ 693
Provision for credit losses								
Model changes	–	–	–	–	(65)	64	–	(1)
Transfers to stage 1	452	(452)	–	–	693	(693)	–	–
Transfers to stage 2	(81)	81	–	–	(123)	123	–	–
Transfers to stage 3	(2)	(341)	343	–	(2)	(227)	229	–
Originations	5	–	–	5	11	2	–	13
Maturities	(5)	(27)	–	(32)	(12)	(60)	–	(72)
Changes in risk, parameters and exposures	(358)	800	175	617	(592)	947	239	594
Write-offs	–	–	(655)	(655)	–	–	(599)	(599)
Recoveries	–	–	137	137	–	–	131	131
Exchange rate and other	1	(1)	–	–	–	1	–	1
Balance at end of period	$ 173	$ 659	$ –	$ 832	$ 161	$ 599	$ –	$ 760
Small business								
Balance at beginning of period	$ 17	$ 16	$ 18	$ 51	$ 15	$ 15	$ 19	$ 49
Provision for credit losses								
Model changes	11	(7)	–	4	–	–	–	–
Transfers to stage 1	18	(18)	–	–	31	(31)	–	–
Transfers to stage 2	(3)	3	–	–	(5)	5	–	–
Transfers to stage 3	–	(9)	9	–	–	(11)	11	–
Originations	13	–	–	13	10	–	–	10
Maturities	(5)	(8)	–	(13)	(4)	(9)	–	(13)
Changes in risk, parameters and exposures	(22)	32	27	37	(31)	48	19	36
Write-offs	–	–	(36)	(36)	–	–	(35)	(35)
Recoveries	–	–	8	8	–	–	7	7
Exchange rate and other	–	1	(4)	(3)	1	(1)	(3)	(3)
Balance at end of period	$ 29	$ 10	$ 22	$ 61	$ 17	$ 16	$ 18	$ 51
Wholesale								
Balance at beginning of period	$ 274	$ 340	$ 365	$ 979	$ 251	$ 352	$ 407	$ 1,010
Provision for credit losses								
Model changes	–	–	–	–	(17)	(12)	(6)	(35)
Transfers to stage 1	145	(133)	(12)	–	207	(207)	–	–
Transfers to stage 2	(33)	36	(3)	–	(66)	93	(27)	–
Transfers to stage 3	(5)	(57)	62	–	(2)	(43)	45	–
Originations	239	44	–	283	227	46	–	273
Maturities	(162)	(165)	–	(327)	(153)	(179)	–	(332)
Changes in risk, parameters and exposures	(178)	331	552	705	(176)	289	137	250
Write-offs	–	–	(440)	(440)	–	–	(207)	(207)
Recoveries	–	–	43	43	–	–	65	65
Exchange rate and other	1	–	(79)	(78)	3	1	(49)	(45)
Balance at end of period	$ 281	$ 396	$ 488	$ 1,165	$ 274	$ 340	$ 365	$ 979

Key inputs and assumptions

The measurement of expected credit losses is a complex calculation that involves a large number of interrelated inputs and assumptions. 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.

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.

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 period, 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.

The following table shows the primary macroeconomic variables used in the models to estimate ACL on performing loans, commitments, and acceptances. The downside scenario reflects a negative macroeconomic event occurring within the first 12 months, with conditions deteriorating for up to two years, followed by a recovery for the remainder of the period. This scenario is grounded in historical experience and assumes a monetary policy response that returns the economy to a long-run, sustainable growth rate within the forecast period. The upside scenario reflects stronger economic growth than the base scenario for the first two years, without a monetary policy response, followed by a return to a long-run sustainable growth rate within the forecast period.

	As at											
	October 31, 2019						October 31, 2018					
	Base Scenario		**Upside Scenario**		**Downside Scenario**		Base Scenario		Upside Scenario		Downside Scenario	
Driver	**Next 12 months**	**2 to 5 years**	**Next 12 months**	**2 to 5 years**	**Next 12 months**	**2 to 5 years**	Next 12 months	2 to 5 years	Next 12 months	2 to 5 years	Next 12 months	2 to 5 years
Unemployment rate: (1)												
Canada	**5.8%**	**6.0%**	**5.4%**	**4.8%**	**6.6%**	**6.8%**	5.8%	6.0%	5.7%	5.1%	6.8%	7.1%
U.S.	**3.8%**	**4.2%**	**3.7%**	**3.4%**	**4.8%**	**5.3%**	3.6%	4.1%	3.6%	3.3%	4.8%	5.3%
Gross domestic product: (2)												
Canada	**1.6%**	**1.8%**	**2.4%**	**2.1%**	**(2.0)%**	**2.8%**	1.7%	1.7%	2.3%	2.1%	(2.0)%	2.7%
U.S.	**1.7%**	**1.5%**	**2.1%**	**1.9%**	**(2.3)%**	**2.6%**	2.1%	1.4%	2.1%	1.9%	(2.3)%	2.6%
Oil price (West Texas Intermediate) average price (US$) (3)	**$ 59**	**$ 68**	**$ 69**	**$ 70**	**$ 43**	**$ 56**	$ 76	$ 72	$ 88	$ 76	$ 56	$ 61
Canadian housing price index growth rate (4)	**4.5%**	**4.7%**	**5.3%**	**2.5%**	**(9.2)%**	**5.8%**	0.1%	3.9%	5.3%	2.5%	(9.2)%	5.8%

(1) Represents the average quarterly unemployment level over the period.
(2) Represents the average quarter-over-quarter gross domestic product annualized over the period.
(3) Represents the average quarterly price per barrel over the period.
(4) Growth rates are calculated on an annualized basis spanning years 2 to 5.

The primary variables driving credit losses in our retail portfolios are Canadian unemployment rates, Canadian gross domestic product and Canadian housing price index. The Canadian overnight interest rate also impacts our retail portfolios. Our wholesale portfolios are affected by all of the variables in the table above; however, the specific variables differ by sector. Other variables also impact our wholesale portfolios including, but not limited to, the U.S. 10 year BBB corporate bond yields, the U.S. 10 year government bond yields, the TSX and S&P 500 indices, natural gas prices (Henry Hub) and the commercial real estate price index.

Increases in the following macroeconomic variables will generally correlate with higher expected credit losses: Canadian and U.S. unemployment rates, Canadian overnight interest rates, U.S. 10 year BBB corporate bond yields, and U.S. 10 year government bond yields.

Increases in the following macroeconomic variables will generally correlate with lower expected credit losses: Canadian housing price index, Canadian and U.S. gross domestic products, TSX index, S&P 500 index, oil prices, natural gas prices, and commercial real estate price index.

In addition to the scenarios described above, two additional downside scenarios were designed for the energy and real estate sectors. The average oil price (West Texas Intermediate) used in our energy downside scenario in the next 12 months is $25 per barrel, and subsequently recovers to an average price of $45 per barrel in the following 2 to 5 years (October 31, 2018 – $27 and $45 per barrel). The housing price index in our real estate downside scenario contracts by 30% in the next twelve months, and subsequently recovers to an average growth rate of 11% on an annualized basis in the following 2 to 5 years (October 31, 2018 – (30)% and 11%).

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 then 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 of the macroeconomic variables identified above. 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. As described above, 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.

The impact of weighting these multiple scenarios increased our ACL on performing loans, relative to our base scenario, by $376 million at October 31, 2019 (October 31, 2018 – $290 million).

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, 2019			October 31, 2018		
	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)	**$ 1,737**	**$ 826**	**$ 2,563**	$ 1,526	$ 841	$ 2,367

(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, 2019				October 31, 2018			
(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	$ 238,377	$ 6,764	$ –	$ 245,141	$ 222,026	$ 3,688	$ –	$ 225,714
Medium risk	14,033	1,347	–	15,380	13,681	1,369	–	15,050
High risk	2,843	2,722	–	5,565	2,577	2,897	–	5,474
Not rated (2)	40,030	726	–	40,756	34,670	578	–	35,248
Impaired	–	–	732	732	–	–	726	726
	295,283	11,559	732	307,574	272,954	8,532	726	282,212
Items not subject to impairment (3)				517				259
Total				308,091				282,471
Loans outstanding – Personal								
Low risk	$ 71,619	$ 1,944	$ –	$ 73,563	$ 71,763	$ 1,256	$ –	$ 73,019
Medium risk	5,254	3,011	–	8,265	6,124	1,925	–	8,049
High risk	843	1,874	–	2,717	998	1,672	–	2,670
Not rated (2)	7,293	105	–	7,398	8,595	64	–	8,659
Impaired	–	–	307	307	–	–	303	303
Total	85,009	6,934	307	92,250	87,480	4,917	303	92,700
Loans outstanding – Credit cards								
Low risk	$ 13,840	$ 103	$ –	$ 13,943	$ 13,185	$ 100	$ –	$ 13,285
Medium risk	2,250	1,827	–	4,077	2,234	1,632	–	3,866
High risk	137	1,432	–	1,569	139	1,331	–	1,470
Not rated (2)	677	45	–	722	764	30	–	794
Total	16,904	3,407	–	20,311	16,322	3,093	–	19,415
Loans outstanding –Small business								
Low risk	$ 2,200	$ 107	$ –	$ 2,307	$ 2,004	$ 46	$ –	$ 2,050
Medium risk	2,163	563	–	2,726	2,230	102	–	2,332
High risk	138	196	–	334	95	178	–	273
Not rated (2)	10	–	–	10	166	1	–	167
Impaired	–	–	57	57	–	–	44	44
Total	4,511	866	57	5,434	4,495	327	44	4,866
Undrawn loan commitments – Retail (4)								
Low risk	$ 196,743	$ 1,894	$ –	$ 198,637	$ 182,426	$ 1,270	$ –	$ 183,696
Medium risk	8,251	246	–	8,497	10,794	239	–	11,033
High risk	851	208	–	1,059	3,740	166	–	3,906
Not rated (2)	5,861	146	–	6,007	5,937	80	–	6,017
Total	211,706	2,494	–	214,200	202,897	1,755	–	204,652
Wholesale – Loans outstanding								
Investment grade	$ 47,133	$ 97	$ –	$ 47,230	$ 46,869	$ 324	$ –	$ 47,193
Non-investment grade	119,778	11,940	–	131,718	106,027	10,190	–	116,217
Not rated (2)	5,862	320	–	6,182	6,692	411	–	7,103
Impaired	–	–	1,829	1,829	–	–	1,096	1,096
	172,773	12,357	1,829	186,959	159,588	10,925	1,096	171,609
Items not subject to impairment (3)				8,911				8,669
Total				195,870				180,278
Undrawn loan commitments – Wholesale (4)								
Investment grade	$ 222,819	$ 18	$ –	$ 222,837	$ 220,626	$ 92	$ –	$ 220,718
Non-investment grade	96,191	9,007	–	105,198	87,894	6,995	–	94,889
Not rated (2)	3,986	–	–	3,986	4,246	–	–	4,246
Total	322,996	9,025	–	332,021	312,766	7,087	–	319,853

(1) As at October 31, 2019, 86% of credit-impaired loans were either fully or partially collateralized (October 31, 2018 – 88%). 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.

(4) Amounts have been revised from those previously presented.

Loans past due but not impaired (1)

	As at							
	October 31, 2019				October 31, 2018			
(Millions of Canadian dollars)	1 to 29 days	30 to 89 days	90 days and greater	Total	1 to 29 days	30 to 89 days	90 days and greater	Total
Retail	$ 3,173	$ 1,369	$ 186	$ 4,728	$ 2,995	$ 1,402	$ 179	$ 4,576
Wholesale	1,543	460	3	2,006	1,246	468	–	1,714
	$ 4,716	$ 1,829	$ 189	$ 6,734	$ 4,241	$ 1,870	$ 179	$ 6,290

(1) 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 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 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 (loan-to-value (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 default during 2019 and 2018.

We sell the NHA MBS pools primarily to 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.

Note 6 Derecognition of financial assets (continued)

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, 2019				October 31, 2018			
(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	$ 32,794	$ 220,250	$ 6,336	$259,380	$ 34,105	$ 202,543	$ 4,271	$ 240,919
Carrying amount of associated liabilities	32,615	220,250	6,336	259,201	33,975	202,543	4,271	240,789
Fair value of transferred assets	$ 32,757	$ 220,250	$ 6,336	$259,343	$ 33,490	$ 202,544	$ 4,271	$ 240,305
Fair value of associated liabilities	33,143	220,250	6,336	259,729	33,916	202,544	4,271	240,731
Fair value of net position	$ (386)	$ –	$ –	$ (386)	$ (426)	$ –	$ –	$ (426)

(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 7 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 customers. 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 a first 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, 2019, $1.2 billion of financial assets held by the conduit was included in Loans (October 31, 2018 – $2.4 billion) and $0.7 billion of ABCP issued by the conduit was included in Deposits (October 31, 2018 – $1.3 billion) 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 notes as investments or for market-making activities, we have provided subordinated loans to the entity to pay upfront expenses, 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, 2019, $7.1 billion of notes issued by our credit card securitization vehicle were included in Deposits on our Consolidated Balance Sheets (October 31, 2018 – $8.5 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, 2019, $16.2 billion of commercial paper issued by the vehicle was included in Deposits on our Consolidated Balance Sheets (October 31, 2018 – $16.6 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, 2019, the total amount of mortgages transferred and outstanding was $53.9 billion (October 31, 2018 – $53.0 billion) and $39.8 billion of covered bonds were recorded as Deposits on our Consolidated Balance Sheets (October 31, 2018 – $36.9 billion).

Municipal bond TOB structures
We sell taxable and tax-exempt municipal bonds into Tender Option Bond (TOB) structures, which consist of a credit enhancement (CE) trust and a TOB trust. The CE trust purchases a bond from us, financed with a trust certificate issued to the TOB trust. The TOB trust then issues floating-rate certificates to short-term investors and a residual certificate that is held by us. We are the remarketing agent for the floating-rate certificates and provide a liquidity facility to the TOB trust which requires us to purchase any certificates tendered but not successfully remarketed. We also provide a letter of credit to the CE trust 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 both the CE trust and 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, 2019, $8.3 billion of municipal bonds were included in Investment securities related to consolidated TOB structures (October 31, 2018 – $7.1 billion) and a corresponding $8.7 billion of floating-rate certificates were included in Deposits on our Consolidated Balance Sheets (October 31, 2018 – $7.6 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, 2019, $465 million of Trading securities held in the consolidated funds (October 31, 2018 – $548 million) and $95 million of Other liabilities representing the fund units held by third parties (October 31, 2018 – $128 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, 2019					
(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	$ 75	$ –	$ 1,865	$ –	$ 503	$ 2,443
Loans	–	2,718	–	6,392	1,517	10,627
Derivatives	97	–	–	–	83	180
Other assets	–	60	–	–	244	304
	$ 172	$ 2,778	$ 1,865	$ 6,392	$ 2,347	$ 13,554
On-balance sheet liabilities						
Derivatives	$ 20	$ –	$ –	$ –	$ –	$ 20
Other liabilities	30	–	–	–	–	30
	$ 50	$ –	$ –	$ –	$ –	$ 50
Maximum exposure to loss (2)	$ 38,032	$ 6,446	$ 2,123	$ 10,756	$ 2,667	$ 60,024
Total assets of unconsolidated structured entities	$ 37,192	$ 17,571	$ 412,046	$ 84,282	$ 293,423	$ 844,514

(Millions of Canadian dollars)	Multi-seller conduits (1)	Structured finance	Non-RBC managed investment funds	Third-party securitization vehicles	Other	Total
	As at October 31, 2018					
On-balance sheet assets						
Securities	$ 65	$ –	$ 2,721	$ –	$ 906	$ 3,692
Loans	–	2,301	–	6,292	1,647	10,240
Derivatives	–	–	–	–	52	52
Other assets	–	176	–	–	288	464
	$ 65	$ 2,477	$ 2,721	$ 6,292	$ 2,893	$ 14,448
On-balance sheet liabilities						
Derivatives	$ 84	$ –	$ –	$ –	$ –	$ 84
Other liabilities	–	–	–	–	–	–
	$ 84	$ –	$ –	$ –	$ –	$ 84
Maximum exposure to loss (2)	$ 38,342	$ 5,477	$ 2,981	$ 10,215	$ 3,556	$ 60,571
Total assets of unconsolidated structured entities	$ 37,590	$ 15,776	$ 523,176	$ 67,446	$ 454,567	$ 1,098,555

(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 $23.6 billion as at October 31, 2019 (October 31, 2018 – $24.7 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 25.

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 foreign exchange forward contracts and interest rate swaps to facilitate our clients' securitization of fixed rate and/or foreign currency denominated assets through the conduits. 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 sized to cover a multiple of loss experience.

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 conduit as noted above.

Structured finance

We purchased U.S. ARS from certain trusts (U.S. ARS Trusts) which fund their long-term investments in student loans by issuing short-term senior and subordinated notes. We are subject to losses on these U.S. ARS Trusts if defaults are experienced on the underlying student loans; however, the principal and accrued interest on the student loans are guaranteed by U.S. government agencies. We act as auction agent for some of these entities but have no legal obligation to purchase the notes issued by these entities in the auction process. We do not consolidate these U.S. ARS Trusts as we do not have decision-making power over the investing and financing activities of the Trusts, which are the activities that most significantly affect the performance of the Trusts.

Additionally, we invest 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 on the floating-rate certificates which may be drawn if certificates are tendered but not able to be remarketed. We do not have decision-making power over the relevant activities of the structures; therefore, we do not consolidate these structures. The assets transferred into these programs are derecognized from our Consolidated Balance Sheets.

We provide senior warehouse financing to 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 one or more third-party equity investors. 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. 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. 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 a reference fund, and we economically hedge our exposure to these derivatives by investing in those reference funds. We also act as custodian or administrator 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 sized to cover a multiple of loss experience. 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, 2019 and 2018, 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, 2019, we transferred commercial mortgages with a carrying amount of $696 million (October 31, 2018 – $352 million) 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, 2019 and 2018, 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 8 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.

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)

	As at October 31, 2019 (1)					
	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	$ 2,014,752	$ 179,624	$ 387	$ 2,194,763	$ 2,186,862	$ 7,901
Swaps	3,294,746	5,026,410	3,331,025	11,652,181	11,180,497	471,684
Options purchased	83,247	462,599	174,042	719,888	719,888	–
Options written	77,601	464,906	182,690	725,197	725,197	–
Foreign exchange contracts						
Forward contracts	1,715,266	30,523	985	1,746,774	1,724,606	22,168
Cross currency swaps	79,264	50,416	55,166	184,846	177,622	7,224
Cross currency interest rate swaps	469,910	894,250	425,301	1,789,461	1,743,465	45,996
Options purchased	54,756	14,409	3,061	72,226	72,226	–
Options written	54,985	14,969	3,383	73,337	73,337	–
Credit derivatives (2)	2,693	14,724	3,437	20,854	20,341	513
Other contracts (3)	201,489	90,436	18,463	310,388	303,893	6,495
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	107,054	118,805	187	226,046	226,046	–
Futures – short positions	363,947	120,247	46	484,240	484,240	–
Options purchased	56,657	36,985	–	93,642	93,642	–
Options written	59,840	16,395	–	76,235	76,235	–
Foreign exchange contracts						
Futures – long positions	28	–	–	28	28	–
Futures – short positions	–	–	–	–	–	–
Other contracts	214,725	44,245	–	258,970	258,970	–
	$ 8,850,960	$ 7,579,943	$ 4,198,173	$ 20,629,076	$ 20,067,095	$ 561,981

	As at October 31, 2018					
	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	$ 1,895,613	$ 8,788	$ –	$ 1,904,401	$ 1,904,401	$ –
Swaps	4,535,040	4,377,512	2,856,403	11,768,955	11,424,094	344,861
Options purchased	101,663	155,985	27,273	284,921	284,921	–
Options written	87,254	156,886	37,217	281,357	281,357	–
Foreign exchange contracts						
Forward contracts	1,397,520	30,688	616	1,428,824	1,420,575	8,249
Cross currency swaps	30,358	4,379	1,170	35,907	27,545	8,362
Cross currency interest rate swaps	347,477	767,742	365,880	1,481,099	1,430,437	50,662
Options purchased	33,202	11,037	1,807	46,046	46,046	–
Options written	37,716	12,250	4,515	54,481	54,481	–
Credit derivatives (2)	1,578	5,263	3,424	10,265	9,752	513
Other contracts	81,720	66,686	17,409	165,815	161,323	4,492
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	38,825	22,465	11	61,301	61,301	–
Futures – short positions	32,424	23,072	6	55,502	55,502	–
Options purchased	2,587	3,312	–	5,899	5,899	–
Options written	2,544	1,291	–	3,835	3,835	–
Foreign exchange contracts						
Futures – long positions	277	–	–	277	277	–
Futures – short positions	340	–	–	340	340	–
Other contracts	228,549	59,308	372	288,229	288,229	–
	$ 8,854,687	$ 5,706,664	$ 3,316,103	$ 17,877,454	$ 17,460,315	$ 417,139

(1) On November 1, 2018, we prospectively implemented the standardized approach for measuring counterparty credit risk (SA-CCR) in accordance with the Capital Adequacy Requirements (CAR) guidelines in determining our derivative notional amounts.

(2) Credit derivatives with a notional value of $0.5 billion (October 31, 2018 – $0.5 billion) are economic hedges. Trading credit derivatives comprise protection purchased of $12.6 billion (October 31, 2018 – $6.2 billion) and protection sold of $7.7 billion (October 31, 2018 – $3.6 billion).

(3) Under SA-CCR, Other contracts exclude loan syndication derivatives of $7.7 billion.

Fair value of derivative instruments (1)

(Millions of Canadian dollars)	As at October 31, 2019 Positive	October 31, 2019 Negative	October 31, 2018 Positive	October 31, 2018 Negative
Held or issued for trading purposes				
Interest rate contracts				
Forward rate agreements	$ 30	$ 31	$ 308	$ 232
Swaps	39,669	32,570	29,340	25,501
Options purchased	5,898	–	3,211	–
Options written	–	6,756	–	3,471
	45,597	39,357	32,859	29,204
Foreign exchange contracts				
Forward contracts	11,263	11,755	13,367	12,929
Cross currency swaps	529	223	174	258
Cross currency interest rate swaps	26,569	26,188	26,837	25,849
Options purchased	1,242	–	1,540	–
Options written	–	898	–	1,272
	39,603	39,064	41,918	40,308
Credit derivatives	169	279	38	89
Other contracts	15,356	18,517	17,668	18,300
	100,725	97,217	92,483	87,901
Held or issued for other-than-trading purposes				
Interest rate contracts				
Swaps	848	742	1,226	1,142
	848	742	1,226	1,142
Foreign exchange contracts				
Forward contracts	116	118	31	33
Cross currency swaps	193	527	212	423
Cross currency interest rate swaps	904	501	1,145	1,104
	1,213	1,146	1,388	1,560
Credit derivatives	–	3	–	5
Other contracts	181	140	150	179
	2,242	2,031	2,764	2,886
Total gross fair values before:	102,967	99,248	95,247	90,787
Valuation adjustments determined on a pooled basis	(697)	5	(625)	34
Impact of netting agreements that qualify for balance sheet offset	(710)	(710)	(583)	(583)
	$ 101,560	$ 98,543	$ 94,039	$ 90,238

(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.

Fair value of derivative instruments by term to maturity (1)

(Millions of Canadian dollars)	As at October 31, 2019 Less than 1 year	1 through 5 years	Over 5 years	Total	October 31, 2018 Less than 1 year	1 through 5 years	Over 5 years	Total
Derivative assets	$ 25,342	$ 28,568	$ 47,650	$ 101,560	$ 28,241	$ 29,197	$ 36,601	$ 94,039
Derivative liabilities	25,495	26,503	46,545	98,543	26,720	27,013	36,505	90,238

(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.

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. In most cases, these internal ratings approximate the external risk ratings of public rating agencies.

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 passes 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 beginning November 1, 2018. 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. As at October 31, 2018, the replacement cost and credit equivalent amounts were calculated under OFSI's non-modelled regulatory current exposure method for counterparty risk.

Derivative-related credit risk (1)

	As at					
	October 31, 2019 (2)			October 31, 2018		
(Millions of Canadian dollars)	**Replacement cost**	**Credit equivalent amount** (3)	**Risk-weighted equivalent** (4)	Replacement cost	Credit equivalent amount (3)	Risk-weighted equivalent (4)
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	**$ 18**	**$ 73**	**$ 19**	$ 307	$ 324	$ 13
Swaps	**6,487**	**15,911**	**6,229**	9,671	20,321	3,363
Options purchased	**149**	**547**	**326**	610	857	407
Options written	**–**	**256**	**113**	–	–	–
Foreign exchange contracts						
Forward contracts	**2,333**	**15,822**	**3,899**	4,589	10,944	3,439
Swaps	**3,047**	**15,678**	**4,001**	9,342	13,718	5,002
Options purchased	**404**	**908**	**285**	443	1,100	478
Options written	**4**	**213**	**67**	–	–	–
Credit derivatives (5)	**156**	**613**	**40**	71	770	153
Other contracts	**1,972**	**10,766**	**4,853**	9,709	9,959	4,303
Exchange-traded contracts	**5,439**	**19,630**	**393**	2,912	11,285	225
	$ 20,009	**$ 80,417**	**$ 20,225**	$ 37,654	$ 69,278	$ 17,383

(1) The amounts presented are net of master netting agreements in accordance with CAR guidelines.
(2) On November 1, 2018, we prospectively implemented SA-CCR in accordance with CAR guidelines in determining our replacement cost, credit equivalent amount and risk-weighted equivalent.
(3) Beginning on November 1, 2018, the credit equivalent amount includes collateral in accordance with CAR guidelines. As at October 31, 2018, the credit equivalent amount included $16 billion of collateral applied.
(4) The risk-weighted balances are calculated in accordance with CAR guidelines and exclude CVA of $13 billion (October 31, 2018 – $12 billion).
(5) The October 31, 2018 amounts exclude credit derivatives issued for other-than-trading purposes related to bought protection.

Replacement cost of derivative instruments by risk rating and by counterparty type

	As at October 31, 2019 (1)								
	Risk rating (2)					**Counterparty type** (3)			
(Millions of Canadian dollars)	**AAA, AA**	**A**	**BBB**	**BB or lower**	**Total**	**Banks**	**OECD governments**	**Other**	**Total**
Gross positive replacement cost	**$ 27,126**	**$ 38,812**	**$ 20,620**	**$ 16,409**	**$ 102,967**	**$ 48,509**	**$ 18,126**	**$ 36,332**	**$ 102,967**
Impact of master netting agreements and applicable margins	**23,146**	**35,088**	**16,719**	**8,005**	**82,958**	**47,376**	**17,705**	**17,877**	**82,958**
Replacement cost (after netting agreements)	**$ 3,980**	**$ 3,724**	**$ 3,901**	**$ 8,404**	**$ 20,009**	**$ 1,133**	**$ 421**	**$ 18,455**	**$ 20,009**

	As at October 31, 2018								
	Risk rating (2)					Counterparty type (3)			
(Millions of Canadian dollars)	AAA, AA	A	BBB	BB or lower	Total	Banks	OECD governments	Other	Total
Gross positive replacement cost	$ 25,458	$ 32,693	$ 21,215	$ 15,881	$ 95,247	$ 42,937	$ 18,749	$ 33,561	$ 95,247
Impact of master netting agreements	14,544	24,255	15,046	3,748	57,593	36,081	8,348	13,164	57,593
Replacement cost (after netting agreements)	$ 10,914	$ 8,438	$ 6,169	$ 12,133	$ 37,654	$ 6,856	$ 10,401	$ 20,397	$ 37,654

(1) On November 1, 2018, we prospectively implemented SA-CCR in accordance with CAR guidelines in determining our replacement cost.
(2) Our internal risk ratings for major counterparty types approximate those of public ratings agencies. Ratings of AAA, AA, A and BBB represent investment grade ratings and ratings of BB or lower represent non-investment grade ratings.
(3) 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.

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 predominately reference Interbank Offered Rates (IBORs) across multiple jurisdictions. Certain swaps will be affected by the Interest Rate Benchmark Reform as the market transitions to alternative risk free or nearly risk free rates by the end of 2021.

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 Interest Rate Benchmark 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 Interest Rate Benchmark Reform, to manage our foreign exchange risk arising from our investments in foreign operations. Our most significant exposures include U.S. dollar, British pound 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 liability 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, 2019				October 31, 2018			
	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 (2)	Cash Flow (2)	Net investment	Not designated in a hedging relationship (2)
Assets								
Derivative instruments	$ 146	$ 77	$ 52	$ 101,285	$ 404	$ 12	$ 13	$ 93,610
Liabilities								
Derivative instruments	187	526	70	97,760	4	413	28	89,793
Non-derivative instruments	–	–	27,688	n.a.	–	–	25,565	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.
(2) Amounts have been revised from those previously presented.
n.a. not applicable

The following tables provide the 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

	As at October 31, 2019					
	Notional amounts				Carrying amount (1)	
(Millions of Canadian dollars, except average rates)	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	$ 4,625	$ 20,439	$ 3,909	$ 28,973	$ 2	$ 187
Hedge of fixed rate liabilities	16,003	48,361	9,065	73,429	144	–
Weighted average fixed interest rate						
Hedge of fixed rate assets	1.9%	2.2%	2.7%	2.2%		
Hedge of fixed rate liabilities	1.7%	1.8%	1.8%	1.7%		

	As at October 31, 2018					
	Notional amounts				Carrying amount (1), (2)	
(Millions of Canadian dollars, except average rates)	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	$ 2,518	$ 12,778	$ 4,668	$ 19,964	$ 311	$ 4
Hedge of fixed rate liabilities	14,946	47,658	7,432	70,036	93	–
Weighted average fixed interest rate						
Hedge of fixed rate assets	1.1%	2.4%	2.8%	2.3%		
Hedge of fixed rate liabilities	1.6%	1.8%	1.8%	1.8%		

(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.
(2) Amounts have been revised from those previously presented.

Cash flow hedges

	As at October 31, 2019					
	Notional amounts				Carrying amount (1)	
(Millions of Canadian dollars, except average rates)	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of variable rate assets	$ 17,327	$ 11,729	$ 1,696	$ 30,752	$ –	$ –
Hedge of variable rate liabilities	200	54,610	4,803	59,613	–	–
Weighted average fixed interest rate						
Hedge of variable rate assets	2.1%	2.0%	2.6%	2.1%		
Hedge of variable rate liabilities	2.6%	1.9%	2.4%	2.0%		
Foreign exchange risk						
Cross currency swaps	$ 2,937	$ 63	$ 88	$ 3,088	$ 2	$ 526
Weighted average CAD-CHF exchange rate	–	–	–	–		
Weighted average CAD-EUR exchange rate	–	1.48	1.55	1.52		
Weighted average USD-EUR exchange rate	1.33	–	–	1.33		

(Millions of Canadian dollars, except average rates)	As at October 31, 2018 Notional amounts: Within 1 year	1 through 5 years	Over 5 years	Total	Carrying amount (1), (2): Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of variable rate assets	$ 12,686	$ 12,805	$ 1,615	$ 27,106	$ –	$ –
Hedge of variable rate liabilities	2,000	38,256	3,978	44,234	–	–
Weighted average fixed interest rate						
Hedge of variable rate assets	2.2%	2.4%	2.7%	2.3%		
Hedge of variable rate liabilities	2.1%	1.9%	2.5%	2.0%		
Foreign exchange risk						
Cross currency swaps	$ 326	$ 2,978	$ 153	$ 3,457	$ 12	$ 368
Weighted average CAD-CHF exchange rate	1.27	–	–	1.27		
Weighted average CAD-EUR exchange rate	–	–	1.52	1.52		
Weighted average USD-EUR exchange rate	–	1.33	–	1.33		

(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.
(2) Amounts have been revised from those previously presented.

Net investment hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2019 Notional/Principal: Within 1 year	1 through 5 years	Over 5 years	Total	Carrying amount: Assets	Liabilities
Foreign exchange risk						
Foreign currency liabilities	**$ 8,701**	**$ 14,843**	**$ 4,144**	**$ 27,688**	**n.a.**	**$ 27,859**
Weighted average CAD-USD exchange rate	**1.31**	**1.29**	**1.31**	**1.30**		
Weighted average CAD-EUR exchange rate	**–**	**–**	**1.51**	**1.51**		
Weighted average CAD-GBP exchange rate	**–**	**1.69**	**–**	**1.69**		
Forward contracts	**$ 5,355**	**$ –**	**$ –**	**$ 5,355**	**$ 52**	**$ 70**
Weighted average CAD-USD exchange rate	**1.33**	**–**	**–**	**1.33**		
Weighted average CAD-EUR exchange rate	**1.47**	**–**	**–**	**1.47**		
Weighted average CAD-GBP exchange rate	**1.67**	**–**	**–**	**1.67**		

(Millions of Canadian dollars, except average rates)	As at October 31, 2018 Notional/Principal: Within 1 year	1 through 5 years	Over 5 years	Total	Carrying amount: Assets	Liabilities
Foreign exchange risk						
Foreign currency liabilities	$ 3,457	$ 18,233	$ 3,875	$ 25,565	n.a.	$ 25,043
Weighted average CAD-USD exchange rate	1.20	1.28	1.31	1.27		
Weighted average CAD-EUR exchange rate	–	–	1.53	1.53		
Weighted average CAD-GBP exchange rate	1.91	1.69	–	1.73		
Forward contracts	$ 3,372	$ –	$ –	$ 3,372	$ 13	$ 28
Weighted average CAD-USD exchange rate	1.31	–	–	1.31		
Weighted average CAD-EUR exchange rate	1.49	–	–	1.49		
Weighted average CAD-GBP exchange rate	1.68	–	–	1.68		

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, 2019 Carrying amount: Assets	Liabilities	Accumulated amount of fair value adjustments on the hedged item included in the carrying amount: Assets	Liabilities	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness
Interest rate risk						
Fixed rate assets (1)	**$29,985**	**$ –**	**$ 569**	**$ –**	**Securities – Investment, net of applicable allowance; Loans – Retail**	**$ 1,028**
Fixed rate liabilities (1)	**–**	**74,099**	**–**	**693**	**Deposits – Business and government; Subordinated debentures**	**(2,045)**

	As at and for the year ended October 31, 2018					
	Carrying amount		Accumulated amount of fair value adjustments on the hedged item included in the carrying amount			
(Millions of Canadian dollars)	Assets	Liabilities	Assets	Liabilities	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness
Interest rate risk						
Fixed rate assets (1)	$ 20,172	$ –	$ (529)	$ –	Securities – Investment, net of applicable allowance; Loans – Retail	$ (650)
Fixed rate liabilities (1)	–	68,714	–	(1,302)	Deposits – Business and government; Subordinated debentures	1,018

(1) As at October 31, 2019, 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 $53 million for fixed-rate assets and a loss of $170 million for fixed-rate liabilities (October 31, 2018 – $105 million and $277 million, respectively).

Cash flow and net investment hedges – assets and liabilities designated as hedged items

	As at and for the year ended October 31, 2019			
			Cash flow hedge/foreign currency translation reserve	
(Millions of Canadian dollars)	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness	Continuing hedges	Discontinued hedges
Cash flow hedges				
Interest rate risk				
Variable rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	$ (608)	$ 163	$ 84
Variable rate liabilities	Deposits – Business and government; Deposits – Personal	1,274	(372)	70
Foreign exchange risk				
Fixed rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	(5)	(1)	–
Fixed rate liabilities	Deposits – Business and government	125	9	–
Net investment hedges				
Foreign exchange risk				
Foreign subsidiaries	n.a.	(7)	(5,407)	(871)

	As at and for the year ended October 31, 2018			
			Cash flow hedge/foreign currency translation reserve	
(Millions of Canadian dollars)	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness	Continuing hedges	Discontinued hedges
Cash flow hedges				
Interest rate risk				
Variable rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	$ 308	$ (187)	$ (171)
Variable rate liabilities	Deposits – Business and government; Deposits – Personal	(769)	706	477
Foreign exchange risk				
Fixed rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	19	(4)	–
Fixed rate liabilities	Deposits – Business and government	60	95	–
Net investment hedges				
Foreign exchange risk				
Foreign subsidiaries	n.a.	315	(5,365)	(923)

n.a. not applicable

Effectiveness of designated hedging relationships

(Millions of Canadian dollars)	For the year ended October 31, 2019 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	$ (1,060)	$ (32)	$ –	$ –
Interest rate contracts – fixed rate liabilities	2,032	(13)	–	–
Cash flow hedges				
Interest rate risk				
Interest rate contracts – variable rate assets	605	8	582	(25)
Interest rate contracts – variable rate liabilities	(1,261)	(5)	(1,265)	220
Foreign exchange risk				
Cross currency swap – fixed rate assets	5	–	8	5
Cross currency swap – fixed rate liabilities	(125)	–	(193)	(106)
Net investment hedges				
Foreign exchange risk				
Foreign currency liabilities	(50)	–	(50)	–
Forward contracts	57	–	57	(2)

(Millions of Canadian dollars)	For the year ended October 31, 2018 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	$ 605	$ (45)	$ –	$ –
Interest rate contracts – fixed rate liabilities	(1,000)	18	–	–
Cash flow hedges				
Interest rate risk				
Interest rate contracts – variable rate assets	(318)	(11)	(275)	(37)
Interest rate contracts – variable rate liabilities	751	(1)	674	101
Foreign exchange risk				
Cross currency swap – fixed rate assets	(19)	–	(10)	(7)
Cross currency swap – fixed rate liabilities	(61)	–	(137)	(165)
Net investment hedges				
Foreign exchange risk				
Foreign currency liabilities	(331)	–	(331)	–
Forward contracts	16	–	17	–

(1) Hedge ineffectiveness recognized in income included losses of $70 million that are excluded from the assessment of hedge effectiveness and are offset by economic hedges (October 31, 2018 – $46 million).

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, 2019 Cash flow hedge reserve	For the year ended October 31, 2019 Foreign currency translation reserve	For the year ended October 31, 2018 Cash flow hedge reserve	For the year ended October 31, 2018 Foreign currency translation reserve
Balance at the beginning of the year	**$ 688**	**$ 4,147**	$ 431	$ 3,545
Cash flow hedges				
Effective portion of changes in fair value:				
Interest rate risk	**(683)**		399	
Foreign exchange risk	**(185)**		(147)	
Equity price risk	**108**		(18)	
Net amount reclassified to profit or loss:				
Ongoing hedges:				
Interest rate risk	**24**		44	
Foreign exchange risk	**104**		172	
Equity price risk	**(93)**		7	
De-designated hedges:				
Interest rate risk	**(219)**		(108)	
Foreign exchange risk	**–**		–	
Net gain on hedge of net investment in foreign operations				
Foreign exchange denominated debt		**(50)**		(331)
Forward foreign exchange contracts		**57**		17
Foreign currency translation differences for foreign operations		**66**		841
Reclassification of losses (gains) on foreign currency translation to income	**–**	**2**	–	–
Reclassification of losses (gains) on net investment hedging activities to income	**–**	**2**	–	–
Tax on movements on reserves during the period	**250**	**(3)**	(92)	75
Balance at the end of the year	**$ (6)**	**$ 4,221**	$ 688	$ 4,147

Note 9 Premises and equipment

(Millions of Canadian dollars)	Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Total
	For the year ended October 31, 2019						
Cost							
Balance at beginning of period	**$ 153**	**$ 1,399**	**$ 2,123**	**$ 1,373**	**$ 2,726**	**$ 264**	**$ 8,038**
Additions (1)	**–**	**–**	**195**	**129**	**81**	**591**	**996**
Transfers from work in process	**–**	**4**	**84**	**82**	**262**	**(432)**	**–**
Disposals	**–**	**(10)**	**(68)**	**(29)**	**(65)**	**–**	**(172)**
Foreign exchange translation	**–**	**–**	**3**	**(1)**	**2**	**–**	**4**
Other	**–**	**2**	**(12)**	**3**	**(5)**	**9**	**(3)**
Balance at end of period	**$ 153**	**$ 1,395**	**$ 2,325**	**$ 1,557**	**$ 3,001**	**$ 432**	**$ 8,863**
Accumulated depreciation							
Balance at beginning of period	**$ –**	**$ 669**	**$ 1,556**	**$ 1,051**	**$ 1,930**	**$ –**	**$ 5,206**
Depreciation	**–**	**45**	**273**	**113**	**196**	**–**	**627**
Disposals	**–**	**(8)**	**(61)**	**(26)**	**(56)**	**–**	**(151)**
Foreign exchange translation	**–**	**–**	**1**	**–**	**1**	**–**	**2**
Other	**–**	**(3)**	**(11)**	**(1)**	**3**	**–**	**(12)**
Balance at end of period	**$ –**	**$ 703**	**$ 1,758**	**$ 1,137**	**$ 2,074**	**$ –**	**$ 5,672**
Net carrying amount at end of period	**$ 153**	**$ 692**	**$ 567**	**$ 420**	**$ 927**	**$ 432**	**$ 3,191**

Note 9 Premises and equipment (continued)

(Millions of Canadian dollars)	Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Total
	For the year ended October 31, 2018						
Cost							
Balance at beginning of period	$ 157	$ 1,363	$ 1,875	$ 1,314	$ 2,586	$ 153	$ 7,448
Additions (1)	–	–	255	43	61	374	733
Transfers from work in process	–	7	44	56	184	(291)	–
Disposals	(5)	(17)	(50)	(41)	(73)	–	(186)
Foreign exchange translation	1	5	4	4	8	–	22
Other	–	41	(5)	(3)	(40)	28	21
Balance at end of period	$ 153	$ 1,399	$ 2,123	$ 1,373	$ 2,726	$ 264	$ 8,038
Accumulated depreciation							
Balance at beginning of period	$ –	$ 608	$ 1,367	$ 984	$ 1,819	$ –	$ 4,778
Depreciation	–	44	246	100	179	–	569
Disposals	–	(10)	(48)	(34)	(55)	–	(147)
Foreign exchange translation	–	2	1	2	6	–	11
Other	–	25	(10)	(1)	(19)	–	(5)
Balance at end of period	$ –	$ 669	$ 1,556	$ 1,051	$ 1,930	$ –	$ 5,206
Net carrying amount at end of period	$ 153	$ 730	$ 567	$ 322	$ 796	$ 264	$ 2,832

(1) As at October 31, 2019, we had total contractual commitments of $338 million to acquire premises and equipment (October 31, 2018 – $273 million).

Note 10 Goodwill and other intangible assets

Goodwill

(Millions of Canadian dollars)	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
	For the year ended October 31, 2019									
Balance at beginning of period	$ 2,528	$ 1,729	$ 579	$ 1,986	$ 2,870	$ 118	$ 112	$ 148	$ 1,067	$ 11,137
Acquisitions	27	–	–	–	71	–	–	–	–	98
Dispositions	–	–	–	(20)	–	–	–	–	–	(20)
Currency translations	–	(2)	–	19	2	2	–	–	–	21
Balance at end of period	$ 2,555	$ 1,727	$ 579	$ 1,985	$ 2,943	$ 120	$ 112	$ 148	$ 1,067	$ 11,236

(Millions of Canadian dollars)	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
	For the year ended October 31, 2018									
Balance at beginning of period	$ 2,527	$ 1,694	$ 576	$ 2,006	$ 2,745	$ 120	$ 112	$ 148	$ 1,049	$ 10,977
Acquisitions	1	–	–	–	80	–	–	–	–	81
Dispositions	–	–	–	–	(8)	–	–	–	–	(8)
Currency translations	–	35	3	(20)	53	(2)	–	–	18	87
Balance at end of period	$ 2,528	$ 1,729	$ 579	$ 1,986	$ 2,870	$ 118	$ 112	$ 148	$ 1,067	$ 11,137

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 value in use, except in circumstances where the carrying amount of a CGU exceeds its value in use. In such cases, the greater of the CGU's fair value less costs of disposal and its value in use is the recoverable amount. Our annual impairment test is performed as at August 1.

In our 2019 and 2018 annual impairment tests, the recoverable amounts of our Caribbean Banking and International Wealth Management CGUs were based on their fair value less costs of disposal. The recoverable amounts of all other CGUs tested were based on their value in use.

Value in use

We calculate value in use using a five-year discounted cash flow method, with the exception of our U.S. Wealth Management (including City National) CGU where cash flow projections covering a six-year period were used, which more closely aligns with the strategic growth plan resulting from the acquisition of City National. 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), with the exception of our U.S. Wealth Management (including City National) CGU where we applied a mid-term growth rate consistent with our growth expectations for this business, reverting to the terminal growth rate after 10 years. Terminal growth rates are based on the current market assessment of gross domestic product and inflation for 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 value in use 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 key inputs and assumptions used was tested by recalculating the recoverable amount using reasonably possible changes to those assumptions. The post-tax discount rates were increased by 1%, terminal growth rates were decreased by 1%, and future cash flows were reduced by 10%. As at August 1, 2019, 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 value in use.

The terminal growth rates and pre-tax discount rates used in our discounted cash flow models are summarized below.

	As at			
	August 1, 2019		August 1, 2018	
	Discount rate (1)	**Terminal growth rate**	Discount rate (1), (2)	Terminal growth rate
Group of cash generating units				
Canadian Banking	**10.2%**	**3.0%**	10.0%	3.0%
Caribbean Banking	**11.9**	**4.2**	11.8	4.3
Canadian Wealth Management	**11.2**	**3.0**	11.2	3.0
Global Asset Management	**11.1**	**3.0**	11.0	3.0
U.S. Wealth Management (including City National)	**11.2**	**3.0**	11.0	3.0
International Wealth Management	**10.8**	**3.0**	10.1	3.0
Insurance	**11.0**	**3.0**	11.0	3.0
Investor & Treasury Services	**10.9**	**3.0**	11.2	3.0
Capital Markets	**11.8**	**3.0**	12.4	3.0

(1) Pre-tax discount rates are determined implicitly based on post-tax discount rates.
(2) Discount rates have been revised from those previously presented.

Fair value less costs of disposal – Caribbean Banking

For our Caribbean Banking CGU, we calculated fair value less costs of disposal using a discounted cash flow method that projects future cash flows over a 5-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. This fair value measurement is categorized as level 3 in the fair value hierarchy as certain significant inputs are not observable.

We use significant judgement 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 applied to cash flows beyond the forecast period. The sensitivity of these key inputs was tested by applying a reasonably possible change to these assumptions. As at August 1, 2019, the recoverable amount of our Caribbean Banking CGU, based on fair value less costs of disposal, was 126% of its carrying amount. If the post-tax discount rate was increased by 1.8%, holding other individual factors constant, the recoverable amount would approximate the carrying amount. No other reasonably possible change in an individual key input or assumption, including decreasing the terminal growth rates by 2.4% or reducing future cash flows by 21%, would result in the CGU's carrying amount exceeding its recoverable amount based on fair value less costs of disposal.

Fair value less costs of disposal – International Wealth Management

For our International Wealth Management CGU, we calculated fair value less costs of disposal using a multiples-based approach. Each business within the CGU was valued using either a Price-to-assets-under-administration (P/AUA) or Price-to-revenue (P/Rev) multiple, as appropriate, to reflect the considerations of a prospective third-party buyer. In 2019, we applied a P/AUA multiple of 2.25% to AUA as at August 1 (August 1, 2018 – 2.5%) and a P/Rev multiple of 2.5x (August 1, 2018 – 2.5x) to revenue for the 12 months preceding the testing date. These multiples represent our best estimate from a range of reasonably possible inputs based on precedent transactions for comparable businesses. This fair value measurement is categorized as level 3 in the fair value hierarchy as certain significant inputs are not observable.

The estimation of fair value less costs of disposal involves significant judgment in the determination of the appropriate valuation approach and inputs and is most sensitive to changes in the P/AUA and P/Rev multiples. These key inputs were tested for sensitivity by reducing each multiple to the low end of the range of reasonably possible inputs considered. As at August 1, 2019, no reasonably possible change in an individual key input or assumption, as described, would result in the CGU's carrying amount exceeding its recoverable amount based on fair value less costs of disposal.

Note 10 Goodwill and other intangible assets (continued)

Other intangible assets

(Millions of Canadian dollars)	Internally generated software	Other software	Core deposit intangibles	Customer list and relationships	In process software	Total
	For the year ended October 31, 2019					
Gross carrying amount						
Balance at beginning of period	$ 5,984	$ 1,582	$ 1,750	$ 1,768	$ 1,146	$ 12,230
Additions	42	49	–	–	1,184	1,275
Acquisitions through business combinations	–	16	–	6	–	22
Transfers	1,009	42	–	–	(1,051)	–
Dispositions	–	(1)	–	–	–	(1)
Impairment losses	(94)	(6)	–	–	(42)	(142)
Currency translations	–	1	1	7	(2)	7
Other changes	–	1	(184)	(8)	5	(186)
Balance at end of period	$ 6,941	$ 1,684	$ 1,567	$ 1,773	$ 1,240	$ 13,205
Accumulated amortization						
Balance at beginning of period	$ (4,501)	$ (1,226)	$ (654)	$ (1,162)	$ –	$ (7,543)
Amortization charge for the year	(793)	(121)	(159)	(124)	–	(1,197)
Dispositions	–	–	–	–	–	–
Impairment losses	30	2	–	–	–	32
Currency translations	(1)	(1)	1	(6)	–	(7)
Other changes	9	(11)	185	1	–	184
Balance at end of period	$ (5,256)	$ (1,357)	$ (627)	$ (1,291)	$ –	$ (8,531)
Net balance at end of period	$ 1,685	$ 327	$ 940	$ 482	$ 1,240	$ 4,674

(Millions of Canadian dollars)	Internally generated software	Other software	Core deposit intangibles	Customer list and relationships	In process software	Total
	For the year ended October 31, 2018					
Gross carrying amount						
Balance at beginning of period	$ 5,143	$ 1,432	$ 1,715	$ 1,753	$ 892	$ 10,935
Additions	40	79	–	–	1,111	1,230
Acquisitions through business combinations	–	–	–	16	–	16
Transfers	798	51	–	–	(849)	–
Dispositions	(1)	(1)	–	–	(2)	(4)
Impairment losses	(1)	–	–	–	(7)	(8)
Currency translations	16	11	35	(1)	4	65
Other changes	(11)	10	–	–	(3)	(4)
Balance at end of period	$ 5,984	$ 1,582	$ 1,750	$ 1,768	$ 1,146	$ 12,230
Accumulated amortization						
Balance at beginning of period	$ (3,825)	$ (1,094)	$ (487)	$ (1,022)	$ –	$ (6,428)
Amortization charge for the year	(669)	(112)	(153)	(143)	–	(1,077)
Dispositions	1	1	–	–	–	2
Impairment losses	–	–	–	–	–	–
Currency translations	(11)	(7)	(14)	3	–	(29)
Other changes	3	(14)	–	–	–	(11)
Balance at end of period	$ (4,501)	$ (1,226)	$ (654)	$ (1,162)	$ –	$ (7,543)
Net balance at end of period	$ 1,483	$ 356	$ 1,096	$ 606	$ 1,146	$ 4,687

Note 11 Significant dispositions

Wealth Management
On October 30, 2019, we completed the sale of our private debt Global Asset Management business in the United Kingdom to Dyal Capital Partners. As a result of the transaction, we recorded a pre-tax gain of $142 million in Non-interest income – Other ($134 million after-tax). The assets, liabilities and equity that were included in the disposal group are not significant.

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.

	Joint ventures		Associated companies	
	As at and for the year ended			
(Millions of Canadian dollars)	**October 31 2019**	October 31 2018	**October 31 2019**	October 31 2018
Carrying amount	**$ 178**	$ 165	**$ 474**	$ 521
Share of:				
Net income	**$ 107**	$ 113	**$ (31)**	$ (92)

We do not have any joint ventures or associated companies that are individually material to our financial results.

During the year ended October 31, 2019, we recognized impairment losses of $2 million with respect to our interests in joint ventures and associated companies (October 31, 2018 – impairment losses of $12 million).

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, 2019, restricted net assets of these subsidiaries, joint ventures and associates were $34.9 billion (October 31, 2018 – $33.9 billion).

Note 13 Other assets

	As at	
(Millions of Canadian dollars)	**October 31 2019**	October 31 2018
Cash collateral	**$ 15,629**	$ 14,467
Margin deposits	**5,688**	4,940
Receivable from brokers, dealers and clients	**2,511**	2,868
Accounts receivable and prepaids	**4,569**	4,047
Investments in joint ventures and associates	**652**	686
Employee benefit assets	**147**	626
Insurance-related assets		
Collateral loans	**926**	991
Policy loans	**95**	99
Reinsurance assets	**748**	656
Other	**78**	163
Deferred income tax asset	**1,989**	1,475
Taxes receivable	**5,553**	5,456
Accrued interest receivable	**2,866**	2,641
Precious metals	**416**	361
Commodity trading receivables	**4,232**	1,898
Other	**2,974**	2,690
	$ 49,073	$ 44,064

Note 14 Deposits

(Millions of Canadian dollars)	As at October 31, 2019 Demand (1)	Notice (2)	Term (3)	Total	As at October 31, 2018 Demand (1)	Notice (2)	Term (3)	Total
Personal	$ 143,958	$ 49,806	$ 100,968	$ 294,732	$ 135,101	$ 48,873	$ 86,180	$ 270,154
Business and government (4)	253,113	13,867	298,502	565,482	238,617	8,606	286,299	533,522
Bank	8,363	920	16,508	25,791	8,750	299	23,472	32,521
	$ 405,434	$ 64,593	$ 415,978	$ 886,005	$ 382,468	$ 57,778	$ 395,951	$ 836,197
Non-interest-bearing (5)								
Canada	$ 93,163	$ 5,692	$ 137	$ 98,992	$ 88,119	$ 5,086	$ –	$ 93,205
United States	34,632	–	–	34,632	34,098	–	–	34,098
Europe (6)	760	–	–	760	564	–	–	564
Other International	5,225	5	–	5,230	5,495	5	–	5,500
Interest-bearing (5)								
Canada	228,386	15,306	333,118	576,810	213,747	15,112	292,641	521,500
United States	4,704	39,626	41,776	86,106	2,478	33,099	67,211	102,788
Europe (4), (6)	33,073	825	30,090	63,988	32,930	1,412	25,749	60,091
Other International	5,491	3,139	10,857	19,487	5,037	3,064	10,350	18,451
	$ 405,434	$ 64,593	$ 415,978	$ 886,005	$ 382,468	$ 57,778	$ 395,951	$ 836,197

(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) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.
(5) 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, 2019, deposits denominated in U.S. dollars, British pounds, Euro and other foreign currencies were $321 billion, $23 billion, $45 billion and $31 billion, respectively (October 31, 2018 – $309 billion, $20 billion, $38 billion and $31 billion, respectively).
(6) 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 2019	October 31 2018
Within 1 year:		
less than 3 months	$ 94,585	$ 89,553
3 to 6 months	62,814	59,109
6 to 12 months	92,507	80,773
1 to 2 years	50,055	51,798
2 to 3 years	31,852	45,550
3 to 4 years	31,373	21,127
4 to 5 years	21,130	23,863
Over 5 years (1)	31,662	24,178
	$ 415,978	$ 395,951
Aggregate amount of term deposits in denominations of one hundred thousand dollars or more (2)	$ 379,000	$ 362,000

(1) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.
(2) Aggregate amounts of term deposits in denominations of one hundred thousand dollars or more have been revised from those previously presented.

Average deposit balances and average rates of interest

(Millions of Canadian dollars, except for percentage amounts)	For the year ended October 31, 2019 Average balances	Average rates	October 31, 2018 Average balances	Average rates
Canada	$ 650,555	1.60%	$ 603,582	1.28%
United States	129,903	1.17	131,715	1.00
Europe (1)	63,333	1.15	59,916	0.91
Other International	26,290	1.20	23,788	1.11
	$ 870,081	1.49%	$ 819,001	1.20%

(1) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

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 and health insurance business as it does not have a material level of region-

specific characteristics. Reinsurance is also used for a majority of our businesses 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 centralized control of 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.

Reinsurance
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 2019**	October 31 2018
Gross premiums	**$ 4,209**	$ 4,236
Premiums ceded to reinsurers	**(225)**	(204)
Net premiums	**$ 3,984**	$ 4,032
Gross claims and benefits (1)	**$ 3,990**	$ 2,615
Reinsurers' share of claims and benefits	**(241)**	(224)
Net claims	**$ 3,749**	$ 2,391

(1) Includes the change in fair value of investments backing our policyholder liabilities, which are largely offset in revenue.

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, 2019 are as follows:

Life insurance
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 2019	October 31 2018
Life Insurance		
Canadian Insurance		
Mortality rates (1)	**0.12%**	0.11%
Morbidity rates (2)	**1.82**	1.82
Future reinvestment yield (3)	**3.69**	3.80
Lapse rates (4)	**0.50**	0.50
International Insurance		
Mortality rates (1)	**0.57**	0.52
Future reinvestment yield (3)	**3.06**	3.14

(1) Average annual death rate for the largest portfolio of insured policies.
(2) Average net settlement 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 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, 2019			October 31, 2018		
(Millions of Canadian dollars)	**Gross**	**Ceded**	**Net**	Gross	Ceded	Net
Life insurance policyholder liabilities						
Life, health and annuity	**$ 11,339**	**$ 601**	**$ 10,738**	$ 9,982	$ 493	$ 9,489
Investment contracts (1)	**38**	**–**	**38**	42	–	42
	$ 11,377	**$ 601**	**$ 10,776**	$ 10,024	$ 493	$ 9,531
Non-life insurance policyholder liabilities						
Unearned premium provision (1)	**$ 29**	**$ –**	**$ 29**	$ 26	$ –	$ 26
Unpaid claims provision	**62**	**2**	**60**	18	3	15
	$ 91	**$ 2**	**$ 89**	$ 44	$ 3	$ 41
	$ 11,468	**$ 603**	**$ 10,865**	$ 10,068	$ 496	$ 9,572

(1) Insurance 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, 2019			October 31, 2018		
(Millions of Canadian dollars)	**Gross**	**Ceded**	**Net**	Gross	Ceded	Net
Balances at beginning of period	**$ 10,024**	**$ 493**	**$ 9,531**	$ 9,687	$ 393	$ 9,294
New and in-force policies	**1,479**	**103**	**1,376**	502	83	419
Changes in assumption and methodology	**(122)**	**5**	**(127)**	(173)	17	(190)
Net change in investment contracts	**(4)**	**–**	**(4)**	8	–	8
Balances at end of period	**$ 11,377**	**$ 601**	**$ 10,776**	$ 10,024	$ 493	$ 9,531

The net increase in Insurance claims and policy benefit liabilities over the prior year was comprised of the net increase in life and health liabilities and reinsurance attributable to market movements on assets backing life and health liabilities and 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 $127 million net decrease to insurance liabilities comprised of: (i) a decrease of $104 million for revised actuarial reserves for updated growth assumptions on investments in equity and commercial real estate; (ii) a decrease of $78 million due to reinsurance contract renegotiations; (iii) a decrease of $17 million due to valuation system and data changes and (iv) an increase of $72 million arising from insurance risk related assumption updates largely due to mortality, morbidity, maintenance, property and casualty margin for adverse deviation and expense assumptions, impacting both gross and ceded insurance policyholder liabilities.

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 2019**	October 31 2018
Increase in market interest rates (1)	1%	**$ (7)**	$ (2)
Decrease in market interest rates (1)	1	**4**	–
Increase in equity market values (2)	10	**1**	6
Decrease in equity market values (2)	10	**(3)**	(8)
Increase in maintenance expenses (3)	5	**(33)**	(29)
Life Insurance (3)			
Adverse change in annuitant mortality rates	2	**(205)**	(131)
Adverse change in assurance mortality rates	2	**(60)**	(59)
Adverse change in morbidity rates	5	**(205)**	(188)
Adverse change in lapse rates	10	**(247)**	(226)

(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 2019**	October 31 2018
Cash	$ **31**	$ 19
Investment in mutual funds	**1,631**	1,348
Other assets (liabilities) net	**1**	1
	$ **1,663**	$ 1,368

Changes in net assets

	For the year ended	
(Millions of Canadian dollars)	**October 31 2019**	October 31 2018
Net assets at beginning of period	$ **1,368**	$ 1,216
Additions (deductions):		
Deposits from policyholders	**557**	537
Net realized and unrealized gains (losses)	**124**	(40)
Interest and dividends	**39**	31
Payment to policyholders	**(386)**	(342)
Management and administrative fees	**(39)**	(34)
Net assets at end of period	$ **1,663**	$ 1,368

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, 2019, and the next valuation will be completed on January 1, 2020.

For the year ended October 31, 2019, total contributions to our pension plans (defined benefit and defined contribution plans) and other post-employment benefit plans were $551 million and $72 million (October 31, 2018 – $594 million and $65 million), respectively. For 2020, total contributions to our pension plans and other post-employment benefit plans are expected to be $549 million and $78 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.

	As at			
	October 31, 2019		October 31, 2018	
(Millions of Canadian dollars)	**Defined benefit pension plans**	**Other post-employment benefit plans**	Defined benefit pension plans	Other post-employment benefit plans
Canada				
Fair value of plan assets	$ **13,679**	$ **1**	$ 12,587	$ 1
Present value of defined benefit obligation	**14,428**	**1,722**	12,270	1,522
Net surplus (deficit)	$ **(749)**	$ **(1,721)**	$ 317	$ (1,521)
International				
Fair value of plan assets	$ **1,106**	$ **–**	$ 977	$ –
Present value of defined benefit obligation	**1,089**	**98**	948	100
Net surplus (deficit)	$ **17**	$ **(98)**	$ 29	$ (100)
Total				
Fair value of plan assets	$ **14,785**	$ **1**	$ 13,564	$ 1
Present value of defined benefit obligation	**15,517**	**1,820**	13,218	1,622
Total net surplus (deficit)	$ **(732)**	$ **(1,819)**	$ 346	$ (1,621)
Effect of asset ceiling	**(1)**	**–**	(1)	–
Total net surplus (deficit), net of effect of asset ceiling	$ **(733)**	$ **(1,819)**	$ 345	$ (1,621)
Amounts recognized in our Consolidated Balance Sheets				
Employee benefit assets	$ **147**	$ **–**	$ 626	$ –
Employee benefit liabilities	**(880)**	**(1,819)**	(281)	(1,621)
Total net surplus (deficit), net of effect of asset ceiling	$ **(733)**	$ **(1,819)**	$ 345	$ (1,621)

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.

	As at or for the year ended			
	October 31, 2019		October 31, 2018	
(Millions of Canadian dollars)	**Defined benefit pension plans (1)**	**Other post-employment benefit plans**	Defined benefit pension plans (1)	Other post-employment benefit plans
Fair value of plan assets at beginning of period	$ **13,564**	$ **1**	$ 13,573	$ 1
Interest income	**532**	**–**	476	–
Remeasurements				
Return on plan assets (excluding interest income)	**910**	**–**	(268)	–
Change in foreign currency exchange rate	**9**	**–**	(10)	–
Contributions – Employer	**339**	**72**	409	65
Contributions – Plan participant	**48**	**18**	49	19
Payments	**(601)**	**(90)**	(586)	(84)
Payments – amount paid in respect of any settlements	**–**	**–**	(64)	–
Other	**(16)**	**–**	(15)	–
Fair value of plan assets at end of period	$ **14,785**	$ **1**	$ 13,564	$ 1
Benefit obligation at beginning of period	$ **13,218**	$ **1,622**	$ 14,005	$ 1,845
Current service costs	**297**	**39**	359	34
Past service costs	**1**	**–**	(13)	(25)
Gains and losses on settlements	**–**	**–**	13	–
Interest expense	**510**	**65**	484	66
Remeasurements				
Actuarial losses (gains) from demographic assumptions	**(4)**	**(7)**	(164)	(66)
Actuarial losses (gains) from financial assumptions	**1,977**	**196**	(828)	(140)
Actuarial losses (gains) from experience adjustments	**59**	**(23)**	(22)	(32)
Change in foreign currency exchange rate	**12**	**–**	(15)	5
Contributions – Plan participant	**48**	**18**	49	19
Payments	**(601)**	**(90)**	(586)	(84)
Payments – amount paid in respect of any settlements	**–**	**–**	(64)	–
Benefit obligation at end of period	$ **15,517**	$ **1,820**	$ 13,218	$ 1,622
Unfunded obligation	$ **29**	$ **1,671**	$ 27	$ 1,481
Wholly or partly funded obligation	**15,488**	**149**	13,191	141
Total benefit obligation	$ **15,517**	$ **1,820**	$ 13,218	$ 1,622

(1) For pension plans with funding deficits, the benefit obligations and fair value of plan assets as at October 31, 2019 were $14,329 million and $13,449 million, respectively (October 31, 2018 – $685 million and $404 million, respectively).

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 2019**	October 31 2018	**October 31 2019**	October 31 2018
Current service costs	**$ 297**	$ 359	**$ 39**	$ 34
Past service costs	**1**	(13)	**–**	(25)
Gains and losses on settlements	**–**	13	**–**	–
Net interest expense (income)	**(22)**	8	**65**	66
Remeasurements of other long term benefits	**–**	–	**13**	(4)
Administrative expense	**16**	15	**–**	–
Defined benefit pension expense	**$ 292**	$ 382	**$ 117**	$ 71
Defined contribution pension expense	**212**	185	**–**	–
	$ 504	$ 567	**$ 117**	$ 71

Service costs for the year ended October 31, 2019 totalled $293 million (October 31, 2018 – $354 million) for pension plans in Canada and $5 million (October 31, 2018 – $(8) million) for International plans. Net interest expense (income) for the year ended October 31, 2019 totalled $(21) million (October 31, 2018 – $4 million) for pension plans in Canada and $(1) million (October 31, 2018 – $4 million) 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 2019**	October 31 2018	**October 31 2019**	October 31 2018
Actuarial (gains) losses:				
Changes in demographic assumptions	**$ (4)**	$ (164)	**$ (11)**	$ (65)
Changes in financial assumptions	**1,977**	(828)	**186**	(134)
Experience adjustments	**59**	(22)	**(22)**	(35)
Return on plan assets (excluding interest based on discount rate)	**(910)**	268	**–**	–
	$ 1,122	$ (746)	**$ 153**	$ (234)

Remeasurements recorded in OCI for the year ended October 31, 2019 were losses of $1,102 million (October 31, 2018 – gains of $633 million) for pension plans in Canada and losses of $20 million (October 31, 2018 – gains of $113 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, real estate leases, private equity and debt. 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, 2019, the management of defined benefit pension investments focused on increased allocation to risk reducing investments and strategies, maintaining diversification, while striving to improve 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)

	As at					
	October 31, 2019			October 31, 2018		
(Millions of Canadian dollars, except percentages)	**Fair value**	**Percentage of total plan assets**	**Quoted in active market** (2)	Fair value	Percentage of total plan assets	Quoted in active market (2)
Equity securities						
Domestic	**$ 1,544**	**10%**	**100%**	$ 1,259	10%	100%
Foreign	**3,215**	**22**	**98**	3,243	24	99
Debt securities						
Domestic government bonds	**3,014**	**21**	**–**	2,643	19	–
Foreign government bonds	**396**	**3**	**–**	288	2	–
Corporate and other bonds	**3,458**	**23**	**–**	3,265	24	–
Alternative investments and other	**3,158**	**21**	**13**	2,866	21	15
	$ 14,785	**100%**	**35%**	$ 13,564	100%	36%

(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) If our assessment of whether or not an asset was quoted in an active market was based on direct investments, 36% of our total plan assets would be classified as quoted in an active market (October 31, 2018 – 40%).

The allocation of equity securities in our pension plans in Canada is 33% (October 31, 2018 – 33%) and that of our International plans is 16% (October 31, 2018 – 23%). The allocation of debt securities in our pension plans in Canada is 47% (October 31, 2018 – 46%) and that of our International plans is 44% (October 31, 2018 – 42%). The allocation of alternative investments and other in our pension plans in Canada is 20% (October 31, 2018 – 21%) and that of our International plans is 40% (October 31, 2018 – 35%).

As at October 31, 2019, the plan assets include 1 million (October 31, 2018 – 1 million) of our common shares with a fair value of $104 million (October 31, 2018 – $95 million) and $57 million (October 31, 2018 – $49 million) of our debt securities. For the year ended October 31, 2019, dividends received on our common shares held in the plan assets were $4 million (October 31, 2018 – $4 million).

Maturity profile

The following table presents the maturity profile of our defined benefit pension plan obligation.

	As at October 31, 2019		
(Millions of Canadian dollars, except participants and years)	**Canada**	**International**	**Total**
Number of plan participants	**69,084**	**7,635**	**76,719**
Actual benefit payments 2019	**$ 551**	**$ 50**	**$ 601**
Benefits expected to be paid 2020	**610**	**50**	**660**
Benefits expected to be paid 2021	**630**	**52**	**682**
Benefits expected to be paid 2022	**650**	**52**	**702**
Benefits expected to be paid 2023	**670**	**52**	**722**
Benefits expected to be paid 2024	**690**	**53**	**743**
Benefits expected to be paid 2025-2029	**3,709**	**258**	**3,967**
Weighted average duration of defined benefit payments	**16.0 years**	**19.2 years**	**16.2 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.

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 2019	October 31 2018	**October 31 2019**	October 31 2018
Discount rate	**3.0%**	4.0%	**3.3%**	4.1%
Rate of increase in future compensation	**3.3%**	3.3%	**n.a.**	n.a.
Healthcare cost trend rates (1)				
– Medical	**n.a.**	n.a.	**3.5%**	3.5%
– 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, 2019				October 31, 2018			
	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	**23.7**	**24.1**	**24.7**	**25.0**	23.7	24.1	24.7	25.0
United States	**20.6**	**22.6**	**22.2**	**24.1**	20.6	22.7	22.3	24.2
United Kingdom	**23.5**	**25.2**	**25.1**	**27.0**	23.4	25.2	25.0	26.9

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 2019.

	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	**$ (2,248)**	**$ (239)**
Impact of 100 bps decrease in discount rate	**2,834**	**304**
Rate of increase in future compensation		
Impact of 50 bps increase in rate of increase in future compensation	**66**	**1**
Impact of 50 bps decrease in rate of increase in future compensation	**(70)**	**(1)**
Mortality rate		
Impact of an increase in longevity by one additional year	**425**	**36**
Healthcare cost trend rate		
Impact of 100 bps increase in healthcare cost trend rate	**n.a.**	**81**
Impact of 100 bps decrease in healthcare cost trend rate	**n.a.**	**(68)**

n.a. not applicable

Note 18 Other liabilities

(Millions of Canadian dollars)	As at October 31 2019	October 31 2018
Cash collateral	$ 16,195	$ 13,907
Accounts payable and accrued expenses	1,598	1,531
Payroll and related compensation	7,416	7,073
Payable to brokers, dealers and clients	3,241	4,078
Negotiable instruments	1,671	1,693
Accrued interest payable (1)	3,496	3,072
Deferred income	2,563	2,259
Taxes payable	2,202	2,071
Precious metals certificates	431	346
Dividends payable	1,567	1,482
Insurance related liabilities	387	364
Deferred income taxes	82	84
Provisions	581	507
Employee benefit liabilities	2,699	1,902
Commodity liabilities	8,487	7,315
Other	5,521	5,438
	$ 58,137	$ 53,122

(1) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

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)				As at	
Maturity	Earliest par value redemption date	Interest rate	Denominated foreign currency (millions)	October 31 2019	October 31 2018
August 12, 2019 (1)		9.00%	US$75	$ –	$ 103
July 15, 2022		5.38%	US$150	206	208
June 8, 2023		9.30%		110	110
July 17, 2024 (2), (3)	July 17, 2019	3.04%		–	998
December 6, 2024	December 6, 2019	2.99% (4)		1,999	1,978
June 4, 2025 (3)	June 4, 2020	2.48% (4)		997	988
January 20, 2026 (3)	January 20, 2021	3.31% (5)		1,483	1,443
January 27, 2026 (3)		4.65%	US$1,500	2,023	1,813
September 29, 2026 (3)	September 29, 2021	3.45% (6)		1,009	988
November 1, 2027	November 1, 2022	4.75%	TT$300	59	59
July 25, 2029 (3)	July 25, 2024	2.74% (7)		1,486	–
October 1, 2083	Any interest payment date	(8)		224	224
June 29, 2085	Any interest payment date	(9)	US$174	229	229
				$ 9,825	$ 9,141
Deferred financing costs				(10)	(10)
				$ 9,815	$ 9,131

The terms and conditions of the debentures are as follows:

(1) All US$75 million outstanding subordinated debentures were redeemed on August 12, 2019 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date.

(2) All $1,000 million outstanding subordinated debentures were redeemed on July 17, 2019 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date.

(3) The notes include non-viability contingency capital (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.

(4) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.10% above the 3-month Canadian Dollar Offered Rate (CDOR).

(5) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 2.35% above the 3-month CDOR.

(6) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.12% above the 3-month CDOR.

(7) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.98% above the 3-month CDOR.

(8) Interest at a rate of 40 basis points above the 30-day Bankers' Acceptance rate.

(9) Interest at a rate of 25 basis points 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, except for the debentures maturing July 15, 2022.

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)	October 31 2019
Within 1 year	$ –
1 to 5 years	316
5 to 10 years	9,056
Thereafter	453
	$ 9,825

Note 20 Trust capital securities

We issued innovative capital instruments, RBC Trust Capital Securities (RBC TruCS), through the structured entity RBC Capital Trust (Trust).

On June 30, 2018, the Trust redeemed all issued and outstanding RBC TruCS 2008-1 for cash at a redemption price of $1,000 per unit.

Note 21 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 outstanding.

(Millions of Canadian dollars, except the number of shares and dividends per share)	As at and for the year ended					
	October 31, 2019			October 31, 2018		
	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	1,439,029	$ 17,635		1,452,898	$ 17,730	
Issued in connection with share-based compensation plans (1)	1,900	136		1,466	92	
Purchased for cancellation (2)	(10,251)	(126)		(15,335)	(187)	
Balance at end of period	1,430,678	$ 17,645	$ 4.07	1,439,029	$ 17,635	$ 3.77
Treasury shares – common shares						
Balance at beginning of period	(235)	$ (18)		(363)	$ (27)	
Purchases	(54,263)	(5,380)		(53,964)	(5,470)	
Sales	53,916	5,340		54,092	5,479	
Balance at end of period	(582)	$ (58)		(235)	$ (18)	
Common shares outstanding	1,430,096	$ 17,587		1,438,794	$ 17,617	
Preferred shares issued						
First preferred (3)						
Non-cumulative, fixed rate						
Series W	12,000	$ 300	$ 1.23	12,000	$ 300	$ 1.23
Series AA	12,000	300	1.11	12,000	300	1.11
Series AC	8,000	200	1.15	8,000	200	1.15
Series AD (4)	–	–	–	10,000	250	1.13
Series AE	10,000	250	1.13	10,000	250	1.13
Series AF	8,000	200	1.11	8,000	200	1.11
Series AG	10,000	250	1.13	10,000	250	1.13
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	6,000	150	1.31	6,000	150	1.31
Non-cumulative, 5-Year Rate Reset						
Series AJ (5)	–	–	0.22	13,579	339	0.88
Series AL (5)	–	–	0.27	12,000	300	1.07
Series AZ	20,000	500	0.96	20,000	500	1.00
Series BB	20,000	500	0.96	20,000	500	0.98
Series BD	24,000	600	0.90	24,000	600	0.90
Series BF	12,000	300	0.90	12,000	300	0.90
Series BK	29,000	725	1.38	29,000	725	1.38
Series BM	30,000	750	1.38	30,000	750	1.38
Series BO (6)	14,000	350	1.27	–	–	–
Non-cumulative, floating rate						
Series AK (5)	–	–	0.23	2,421	61	0.78
Non-cumulative, fixed rate/floating rate						
Series C-2	20	31	US$ 67.50	20	31	US$ 67.50
	227,020	$ 5,706		251,020	$ 6,306	
Treasury shares – preferred shares						
Balance at beginning of period (7)	114	$ 3		6	$ –	
Purchases	(8,021)	(184)		(10,215)	(256)	
Sales	7,941	182		10,323	259	
Balance at end of period (7)	34	$ 1		114	$ 3	
Preferred shares outstanding	227,054	$ 5,707		251,134	$ 6,309	

(1) Includes fair value adjustments to stock options of $29 million (2018 – $15 million).
(2) During the year ended October 31, 2019, we purchased common shares for cancellation at an average cost of $100.41 per share with a book value of $12.29 per share. During the year ended October 31, 2018, we purchased common shares for cancellation at an average cost of $99.29 per share with a book value of $12.22 per share.
(3) First Preferred Shares were issued at $25 per share with the exception of Non-Cumulative Fixed Rate/Floating Rate First Preferred Shares, Series C-2 (Series C-2) which were issued at US$1,000 per share (equivalent to US$25 per depositary share).
(4) On November 24, 2018, we redeemed all 10 million issued and outstanding Non-Cumulative First Preferred Shares, Series AD, for cash at a redemption price of $25 per share.
(5) On February 24, 2019, we redeemed all 2.4 million issued and outstanding Non-Cumulative First Preferred Shares Series AK, all 13.6 million issued and outstanding Non-Cumulative 5 year Rate Reset First Preferred Shares Series AJ, and all 12 million issued and outstanding Non-Cumulative 5-year Rate Reset First Preferred Shares Series AL, at a price of $25 per share.
(6) On November 2, 2018, we issued 14 million Non-Cumulative 5-year Rate Reset First Preferred Shares, Series BO, totalling $350 million.
(7) Positive amounts represent a short position in treasury shares.

Significant terms and conditions of preferred shares

As at October 31, 2019	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 W (4)	4.90%		$ .306250	February 24, 2010	January 31, 2005	$ 25.00
Series AA	4.45%		.278125	May 24, 2011	April 4, 2006	25.00
Series AC	4.60%		.287500	November 24, 2011	November 1, 2006	25.00
Series AE	4.50%		.281250	February 24, 2012	January 19, 2007	25.00
Series AF	4.45%		.278125	May 24, 2012	March 14, 2007	25.00
Series AG	4.50%		.281250	May 24, 2012	April 26, 2007	25.00
Series BH (5)	4.90%		.306250	November 24, 2020	June 5, 2015	26.00
Series BI (5)	4.90%		.306250	November 24, 2020	July 22, 2015	26.00
Series BJ (5)	5.25%		.328125	February 24, 2021	October 2, 2015	26.00
Non-cumulative, 5-Year Rate Reset (6)						
Series AZ (5)	3.70%	2.21%	.231250	May 24, 2019	January 30, 2014	25.00
Series BB (5)	3.65%	2.26%	.228125	August 24, 2019	June 3, 2014	25.00
Series BD (5)	3.60%	2.74%	.225000	May 24, 2020	January 30, 2015	25.00
Series BF (5)	3.60%	2.62%	.225000	November 24, 2020	March 13, 2015	25.00
Series BK (5)	5.50%	4.53%	.343750	May 24, 2021	December 16, 2015	25.00
Series BM (5)	5.50%	4.80%	.343750	August 24, 2021	March 7, 2016	25.00
Series BO (5)	4.80%	2.38%	.300000	February 24, 2024	November 2, 2018	25.00
Non-cumulative, fixed rate/ floating rate						
Series C-2 (7)	6.75%	4.052%	US$16.875000	November 7, 2023	November 2, 2015	US$1,000.00

(1) 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.

(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, BK, BM, 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 Series W, AA, AC, AE, AF, AG, BH, BI and BJ, 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 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) Subject to the approval of the Toronto Stock Exchange, we may, on or after February 24, 2010, convert First Preferred Shares Series W into our common shares. First Preferred Shares Series W may be converted into that number of common shares determined by dividing the current redemption price by the greater of $2.50 and 95% of the weighted average trading price of common shares at such time.

(5) 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 ($25 plus declared and unpaid dividends) by the conversion price.

(6) 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.

(7) 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.

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 United States. The requirements of our DRIP are satisfied through either open market share purchases or shares issued from treasury. During 2019 and 2018, the requirements of our DRIP were satisfied through open market share purchases.

Shares available for future issuances

As at October 31, 2019, 42.9 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 22 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, 2019, in respect of the stock option plans was $6 million (October 31, 2018 – $6 million). The compensation expense related to non-vested options was $3 million at October 31, 2019 (October 31, 2018 – $3 million), to be recognized over the weighted average period of 1.8 years (October 31, 2018 – 1.1 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, 2019		October 31, 2018	
(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	**7,770**	**$ 71.40**	8,566	$ 64.96
Granted	**1,090**	**96.55**	773	102.33
Exercised (2), (3)	**(1,900)**	**55.05**	(1,440)	50.42
Forfeited in the period	**(10)**	**54.99**	(129)	78.12
Outstanding at end of period	**6,950**	**$ 79.88**	7,770	$ 71.40
Exercisable at end of period	**2,980**	**$ 64.24**	3,726	$ 55.82

(1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rates as of October 31, 2019 and October 31, 2018. 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 $105 million (October 31, 2018 – $73 million) and the weighted average share price at the date of exercise was $103.15 (October 31, 2018 – $101.81).
(3) New shares were issued for all stock options exercised in 2019 and 2018.

Options outstanding as at October 31, 2019 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)**
$36.46 – $52.23	**704**	**$ 45.63**	**2.35**	**704**	**$ 45.63**
$52.60 – $69.17	**907**	**60.47**	**3.15**	**907**	**60.47**
$73.14 – $76.68	**1,490**	**74.57**	**5.92**	**818**	**74.76**
$78.59 – $90.23	**1,986**	**87.00**	**6.49**	**551**	**78.59**
$96.55 – $102.33	**1,863**	**98.95**	**8.70**	**–**	**–**
	6,950	**$ 79.88**	**6.10**	**2,980**	**$ 64.24**

(1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rate as of October 31, 2019.

The weighted average fair value of options granted during the year ended October 31, 2019 was estimated at $5.61 (October 31, 2018 – $6.66). 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 2019**	October 31 2018
Share price at grant date	**$ 94.09**	$ 101.83
Risk-free interest rate	**2.01%**	1.71%
Expected dividend yield	**3.77%**	3.66%
Expected share price volatility	**12%**	13%
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, 2019, we contributed $112 million (October 31, 2018 – $97 million), under the terms of these plans, towards the purchase of our common shares. As at October 31, 2019, an aggregate of 35 million common shares were held under these plans (October 31, 2018 – 35 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 a deferred bonus plan for certain key employees within Capital Markets. The deferred bonus is invested as RBC share units and a specified percentage vests on each of the three anniversary dates following the grant date. 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 United States. 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, 2019		October 31, 2018	
(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	**495**	**$ 99.69**	376	$ 100.71
Deferred bonus plan	**3,423**	**105.12**	4,820	95.18
Performance deferred share award plans	**2,471**	**96.39**	2,099	101.55
Deferred compensation plans	**116**	**94.06**	91	103.55
Other share-based plans	**1,210**	**96.28**	978	101.48
	7,715	**$ 100.42**	8,364	$ 97.85

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.

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, 2019		October 31, 2018	
(Millions of Canadian dollars except units)	**Units (thousands)**	**Carrying amount**	Units (thousands)	Carrying amount
Deferred share unit plans	**5,288**	**$ 562**	4,631	$ 446
Deferred bonus plan	**8,820**	**937**	10,347	990
Performance deferred share award plans	**5,621**	**597**	5,892	565
Deferred compensation plans (1)	**3,072**	**326**	3,299	317
Other share-based plans	**1,787**	**185**	2,140	202
	24,588	**$ 2,607**	26,309	$ 2,520

(1) Excludes obligations not determined based on the quoted market price of our common shares.

Note 22 Share-based compensation (continued)

Compensation expenses recognized under deferred share and other plans

(Millions of Canadian dollars)	For the year ended October 31 2019	October 31 2018
Deferred share unit plans	$ 77	$ 6
Deferred bonus plan	274	139
Performance deferred share award plans	294	190
Deferred compensation plans	250	80
Other share-based plans	106	78
	$ 1,001	$ 493

Note 23 Income taxes

Components of tax expense

(Millions of Canadian dollars)	For the year ended October 31 2019	October 31 2018
Income taxes (recoveries) in Consolidated Statements of Income		
Current tax		
Tax expense for current year	$ 3,256	$ 3,351
Adjustments for prior years	(26)	(212)
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period	(31)	(11)
	3,199	3,128
Deferred tax		
Origination and reversal of temporary difference	(114)	28
Effects of changes in tax rates	29	148
Adjustments for prior years	(57)	152
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period, net	(14)	(127)
	(156)	201
	3,043	3,329
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	51	12
Provision for credit losses recognized in income	–	(5)
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	(60)	(52)
Unrealized foreign currency translation gains (losses)	2	2
Net foreign currency translation gains (losses) from hedging activities	2	(77)
Reclassification of losses (gains) on net investment hedging activities to income	1	–
Net gains (losses) on derivatives designated as cash flow hedges	(200)	84
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	(50)	8
Remeasurements of employee benefit plans	(333)	256
Net fair value change due to credit risk on financial liabilities designated as fair value through profit or loss	18	45
Net gains (losses) on equity securities designated at fair value through other comprehensive income	5	(5)
Share-based compensation awards	(9)	15
	(573)	283
Total income taxes	$ 2,470	$ 3,612

The effective tax rate of 19.1% decreased 200 bps, primarily due to an increase in income from lower tax rate jurisdictions and the impact of the U.S. Tax Reform which resulted in the write-down of net deferred tax assets in the prior 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

(Millions of Canadian dollars, except for percentage amounts)	For the year ended October 31, 2019		October 31, 2018	
Income taxes at Canadian statutory tax rate	$ 4,217	26.5%	$ 4,176	26.5%
Increase (decrease) in income taxes resulting from				
Lower average tax rate applicable to subsidiaries	(815)	(5.1)	(752)	(4.8)
Tax-exempt income from securities	(310)	(1.9)	(285)	(1.8)
Tax rate change	29	0.1	148	0.9
Other	(78)	(0.5)	42	0.3
Income taxes in Consolidated Statements of Income / effective tax rate	$ 3,043	19.1%	$ 3,329	21.1%

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

(Millions of Canadian dollars)	As at and for the year ended October 31, 2019					
	Net asset beginning of period	Change through equity	Change through profit or loss	Exchange rate differences	Other	Net asset end of period
Net deferred tax asset/(liability)						
Allowance for credit losses	$ 695	$ –	$ 23	$ (2)	$ –	$ 716
Deferred compensation	1,033	9	197	7	–	1,246
Business realignment charges	3	–	7	–	–	10
Tax loss and tax credit carryforwards	203	–	(10)	–	9	202
Deferred income	(48)	–	(11)	(1)	–	(60)
Financial instruments measured at fair value through other comprehensive income	(8)	(33)	(1)	(1)	–	(43)
Premises and equipment and intangibles	(858)	–	(4)	(4)	(3)	(869)
Deferred expense	55	36	(47)	1	–	45
Pension and post-employment related	295	339	(6)	3	–	631
Other	21	3	8	(3)	–	29
	$ 1,391	$ 354	$ 156	$ –	$ 6	$ 1,907
Comprising						
Deferred tax assets	$ 1,475					$ 1,989
Deferred tax liabilities	(84)					(82)
	$ 1,391					$ 1,907

(Millions of Canadian dollars)	As at and for the year ended October 31, 2018					
	Net asset beginning of period	Change through equity	Change through profit or loss	Exchange rate differences	Other	Net asset end of period
Net deferred tax asset/(liability)						
Allowance for credit losses	$ 703	$ (6)	$ 1	$ (3)	$ –	$ 695
Deferred compensation	1,491	(15)	(502)	59	–	1,033
Business realignment charges	11	–	(8)	–	–	3
Tax loss and tax credit carryforwards	19	–	188	(4)	–	203
Deferred income	(11)	–	(37)	–	–	(48)
Financial instruments measured at fair value through other comprehensive income	48	19	(74)	(1)	–	(8)
Premises and equipment and intangibles	(1,003)	(1)	182	(36)	–	(858)
Deferred expense	76	–	(23)	2	–	55
Pension and post-employment related	571	(260)	(16)	–	–	295
Other	(54)	3	88	(16)	–	21
	$ 1,851	$ (260)	$ (201)	$ 1	$ –	$ 1,391
Comprising						
Deferred tax assets	$ 1,948					$ 1,475
Deferred tax liabilities	(97)					(84)
	$ 1,851					$ 1,391

The tax loss and tax credit carryforwards amount of deferred tax assets relates to losses and tax credits in our Canadian, U.S., Caribbean, and Japanese operations. Deferred tax assets of $202 million were recognized at October 31, 2019 (October 31, 2018 – $203 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.

Note 23 Income taxes (continued)

As at October 31, 2019, unused tax losses, tax credits and deductible temporary differences of $413 million, $365 million and $nil (October 31, 2018 – $443 million, $426 million and $39 million) available to be offset against potential tax adjustments or future taxable income were not recognized as deferred tax assets. This amount includes unused tax losses of $1 million which expire within one year (October 31, 2018 – $4 million), $7 million which expire in two to four years (October 31, 2018 – $2 million) and $405 million which expire after four years (October 31, 2018 – $437 million). There are no tax credits that will expire in one year (October 31, 2018 – $nil), $60 million that will expire in two to four years (October 31, 2018 – $45 million) and $305 million that will expire after four years (October 31, 2018 – $381 million). In addition, there are no deductible temporary differences that will expire in one year (October 31, 2018 – $1 million), nor that will expire in two to four years (October 31, 2018 – $1 million) or that will expire after four years (October 31, 2018 – $37 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 $17.9 billion as at October 31, 2019 (October 31, 2018 – $14.6 billion).

Tax examinations and assessments

We have received reassessments during the year from the Canada Revenue Agency (CRA), in respect of the 2014, 2013 and 2012 taxation years, which suggest that Royal Bank of Canada owes additional income taxes of approximately $756 million as they denied the deductibility of certain dividends. These are consistent with the reassessments received for taxation years 2011, 2010, and 2009 for 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.

U.S. Tax Reform

The majority of the provisions in the U.S. Tax Cuts and Jobs Act legislation (U.S. Tax Reform), which was passed in December 2017, took effect at the beginning of calendar year 2018 or for fiscal years beginning in 2018. The changes include a reduction in the corporate income tax rate from 35% to 21% which resulted in a write-down of $178 million (US$142 million), primarily related to net deferred tax assets in the prior year.

Note 24 Earnings per share

	For the year ended	
(Millions of Canadian dollars, except share and per share amounts)	**October 31 2019**	October 31 2018
Basic earnings per share		
Net income	**$ 12,871**	$ 12,431
Preferred share dividends	**(269)**	(285)
Net income attributable to non-controlling interests	**(11)**	(31)
Net income available to common shareholders	**12,591**	12,115
Weighted average number of common shares (in thousands)	**1,434,779**	1,443,894
Basic earnings per share (in dollars)	**$ 8.78**	$ 8.39
Diluted earnings per share		
Net income available to common shareholders	**$ 12,591**	$ 12,115
Dilutive impact of exchangeable shares	**15**	15
Net income available to common shareholders including dilutive impact of exchangeable shares	**12,606**	12,130
Weighted average number of common shares (in thousands)	**1,434,779**	1,443,894
Stock options (1)	**2,011**	2,691
Issuable under other share-based compensation plans	**742**	742
Exchangeable shares (2)	**3,150**	3,158
Average number of diluted common shares (in thousands)	**1,440,682**	1,450,485
Diluted earnings per share (in dollars)	**$ 8.75**	$ 8.36

(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, 2019, an average of 767,225 outstanding options with an average exercise price of $102.33 were excluded from the calculation of diluted earnings per share. For the year ended October 31, 2018, an average of 657,353 outstanding options with an average exercise price of $102.33 were excluded from the calculation of diluted earnings per share.

(2) Includes exchangeable preferred shares.

Note 25 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 2019**	October 31 2018
Financial guarantees		
Financial standby letters of credit	**$ 16,608**	$ 15,502
Commitments to extend credit		
Backstop liquidity facilities	**36,305**	36,267
Credit enhancements	**1,692**	2,128
Documentary and commercial letters of credit	**268**	268
Other commitments to extend credit	**225,911**	223,954
Other credit-related commitments		
Securities lending indemnifications	**91,625**	107,239
Performance guarantees	**7,061**	6,955
Other	**787**	391

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. The term of 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 owned 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 from us and other third parties 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 third party which may include the underlying shipment of goods to which they relate.

Other commitments to extend credit

Commitments to extend credit represent unused portions of authorizations to extend credit in the form of loans, 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 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.

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, 2019, the total balance of uncommitted amounts was $287 billion (October 31, 2018 – $264 billion).

Other commitments

We act as underwriter for certain new issuances under which we alone or together with a syndicate of financial institutions purchase the new issue for resale to investors. In connection with these activities, our commitments were $35 million as at October 31, 2019, (October 31, 2018 – $141 million).

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, 2019, we have unfunded commitments of $684 million (October 31, 2018 – $948 million) representing the aggregate amount of cash we are obligated to be contributed 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 the Large Value Transfer System (LVTS), which is 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 LVTS activities 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 table below. For the year ended October 31, 2019, we had on average $4.9 billion of assets pledged intraday to the Bank of Canada on a daily basis (October 31, 2018 – $4.0 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, 2019 and October 31, 2018.

Assets pledged against liabilities and collateral assets held or re-pledged

(Millions of Canadian dollars)	As at October 31 2019	October 31 2018
Sources of pledged assets and collateral		
Bank assets		
Loans	**$ 80,542**	$ 79,798
Securities	**55,544**	48,993
Other assets	**21,316**	19,406
	157,402	148,197
Client assets (1)		
Collateral received and available for sale or re-pledging	**448,338**	402,187
Less: not sold or re-pledged	**(49,325)**	(53,590)
	399,013	348,597
	$ 556,415	$ 496,794
Uses of pledged assets and collateral		
Securities borrowing and lending	**$ 146,590**	$ 119,087
Obligations related to securities sold short	**34,686**	32,247
Obligations related to securities lent or sold under repurchase agreements	**229,905**	209,353
Securitization	**47,254**	49,997
Covered bonds	**42,103**	36,959
Derivative transactions	**26,448**	21,110
Foreign governments and central banks	**5,963**	5,058
Clearing systems, payment systems and depositories	**4,804**	4,006
Other	**18,662**	18,977
	$ 556,415	$ 496,794

(1) Primarily relates to Obligations related to securities lent or sold under repurchase agreements, Securities lent and Derivative transactions.

Lease commitments

Operating lease commitments

We are obligated under a number of non-cancellable operating leases for premises and equipment. These leases have various terms, escalation and renewal rights. The lease agreements do not include any clauses that impose any restriction on our ability to pay dividends, engage in debt financing transactions, or enter into further lease agreements. The minimum future lease payments under non-cancellable operating leases are as follows.

(Millions of Canadian dollars)	As at October 31, 2019 Land and buildings	Equipment	October 31, 2018 Land and buildings	Equipment
Future minimum lease payments				
No later than one year	**$ 721**	**$ 88**	$ 684	$ 103
Later than one year and no later than five years	**2,251**	**101**	2,081	137
Later than five years	**3,039**	**–**	2,816	–
	6,011	**189**	5,581	240
Less: Future minimum sublease payments to be received	**(25)**	**–**	(11)	–
Net future minimum lease payments	**$ 5,986**	**$ 189**	$ 5,570	$ 240

Note 26 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. 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 accruals 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) regulatory investigations and 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.

In addition to the LIBOR actions, in January 2019, a number of financial institutions, including Royal Bank of Canada and RBC Capital Markets LLC, were named in a purported class action in New York alleging violations of the U.S. antitrust laws and common law principles of unjust enrichment in the setting of LIBOR after the Intercontinental Exchange took over administration of the benchmark interest rate from the British Bankers' Association in 2014. 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.

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 are being appealed.

On October 28, 2016, Royal Bank of Canada was granted an exemption by the U.S. Department of Labor that will allow Royal Bank of Canada and its current and future affiliates to continue to qualify for the Qualified Professional Asset Manager 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. An application to grant more lengthy exemptive relief is pending.

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.

Interchange fees litigation

Since 2011, seven proposed class actions have been commenced in Canada: *Bancroft-Snell v. Visa Canada Corporation, et al., 9085-4886 Quebec Inc. v. Visa Canada Corporation, et al., Coburn and Watson's Metropolitan Home v. Bank of America Corporation, et al. (Watson), Macaronies Hair Club and Laser Centre Inc. v. BofA Canada Bank, et al., 1023926 Alberta Ltd. v. Bank of America Corporation, et al., The Crown & Hand Pub Ltd. v. Bank of America Corporation, et al., and Hello Baby Equipment Inc. v. BofA Canada Bank, et al.* The defendants in each action are VISA Canada Corporation (Visa), MasterCard International Incorporated (MasterCard), Royal Bank of Canada and other financial institutions. The plaintiff class members are Canadian merchants who accept Visa and/or MasterCard branded credit cards for payment. The actions allege, among other things, that from March 2001 to the present, Visa and MasterCard conspired with their issuing banks and acquirers to set default interchange rates and merchant discount fees and that certain rules (Honour All Cards and No Surcharge) have the effect of increasing the merchant discount fees. The actions include claims of civil conspiracy, breach of the *Competition Act* (the Act) interference with economic relations and unjust enrichment. The claims seek unspecified general and punitive damages. In *Watson*, a decision to partially certify the action as a class proceeding was released on March 27, 2014, and was appealed. On August 19, 2015, the British Columbia Court of Appeal struck the plaintiff class representative's cause of action under section 45 of the Act and reinstated the plaintiff class representative's cause of action in civil conspiracy by unlawful means, among other rulings. In October 2016, the trial court in *Watson* denied a motion by the plaintiff to revive the stricken section 45 *Competition Act* claim, and also denied the plaintiff's motion to add new causes of action. The Supreme Court of Canada declined the B.C. class action plaintiffs' request to appeal the decision striking the plaintiffs' cause of action under section 45 of the *Competition Act*. The trial in the Watson proceeding has been rescheduled from October 14, 2019 to October 19, 2020.

In 9085-4886 Quebec Inc. v. Visa Canada Corporation, et al., the Quebec-court dismissed the Competition Act claims by Quebec merchants for post-2010 damages and certified a class action as to the remaining claims. The merchants appealed and on July 25, 2019, the Quebec Court of Appeal allowed the appeal to also authorize the merchants to proceed under section 45 of the Competition Act for claims after March 12, 2010 and for claims under section 49 of the Competition Act.

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.

Foreign exchange matters

Various regulators are conducting inquiries regarding potential violations of antitrust law by a number of banks, including Royal Bank of Canada, regarding foreign exchange trading.

Beginning in 2015, putative class actions were brought against Royal Bank of Canada and/or RBC Capital Markets, LLC in the United States and Canada. 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' 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 US District Court. The Canadian class actions and one other U.S. action that is purportedly brought on behalf of different classes of plaintiffs remain pending.

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.

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 27 Related party transactions

Related parties

Related parties include associated companies, post-employment benefit plans for the benefit of our employees, 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, jointly controlled by or significantly influenced 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 individuals that report directly to him, including the Chief Administrative Officer, Chief Financial Officer, Chief Human Resources Officer, Group Chief Risk Officer, Chief Strategy & Corporate Development Officer, and Group Heads for Wealth Management and Insurance, Capital Markets and Investor & Treasury Services, Technology & Operations, and Personal & Commercial Banking. 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 2019**	October 31 2018
Salaries and other short-term employee benefits (1)	**$ 26**	$ 34
Post-employment benefits (2)	**2**	2
Share-based payments	**44**	42
	$ 72	$ 78

(1) 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 22 for further details. Directors receive retainers but do not receive salaries and other short-term employee benefits.
(2) 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, 2019		October 31, 2018	
(Millions of Canadian dollars, except number of units)	**No. of units held**	**Value**	No. of units held	Value
Stock options (1)	**2,372,714**	**$ 51**	2,154,835	$ 37
Other non-option stock based awards (1)	**1,481,096**	**157**	1,440,002	138
RBC common and preferred shares	**463,362**	**49**	453,316	43
	4,317,172	**$ 257**	4,048,153	$ 218

(1) 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, 2019, total loans to KMP, Directors and their close family members were $8 million (October 31, 2018 – $10 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, 2019 and October 31, 2018. 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, 2019, loans to joint ventures and associates were $222 million (October 31, 2018 – $225 million) and deposits from joint ventures and associates were $180 million (October 31, 2018 – $203 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, 2019 and October 31, 2018. $1 million of guarantees have been given to joint ventures and associates for the year ended October 31, 2019 (October 31, 2018 – $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 2019**	October 31 2018
Commitments and other contingencies	**$ 430**	$ 621
Other fees received for services rendered	**47**	41
Other fees paid for services received	**128**	150

Note 28 Results by business segment

Composition of business segments

For management purposes, based on the products and services offered, we are organized into five 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 Mutual fund revenue, Service charges 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 line 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 life, health, home, auto, travel, wealth, annuities and reinsurance advice and solutions as well as creditor and business insurance services to individual, business and group clients. In Canada, we offer our products and services through our proprietary distribution channels, comprised of the field sales force, advice centers and online, as well as through independent insurance advisors and affinity relationships. 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 is a provider of asset, cash management, transaction banking, and treasury services to institutional clients worldwide. We also provide Canadian dollar cash management, correspondent banking and trade finance for financial institutions globally and short-term funding and liquidity management for the bank. Non-interest income in Investor & Treasury Services mainly comprises Investment management and custodial fees.

Capital Markets provides expertise in banking, finance and capital markets to corporations, institutional investors, asset managers, governments and central banks around the world in our two main business lines: Corporate and Investment Banking and Global Markets. In North America, we offer a full suite of products and services which include corporate and investment banking, equity and debt origination and distribution, as well as sales and trading. Outside North America, we have a select presence in the U.K. & Europe, Australia, Asia & other markets. In the U.K. & Europe, we offer a diversified set of capabilities in our key sectors of expertise such as energy, mining and infrastructure, industrial, consumer, healthcare, technology and financial services. 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 enterprise funding, securitizations, net charges 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, 2019 was $450 million (October 31, 2018 – $542 million).

Geographic segments

For geographic reporting, our segments are grouped into Canada, United States 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.

(Millions of Canadian dollars)	For the year ended October 31, 2019									
	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)	$ 12,653	$ 2,993	$ –	$ (44)	$ 4,043	$ 104	$ 19,749	$ 14,375	$ 4,058	$ 1,316
Non-interest income	5,212	9,150	5,710	2,389	4,245	(453)	26,253	14,037	6,411	5,805
Total revenue	17,865	12,143	5,710	2,345	8,288	(349)	46,002	28,412	10,469	7,121
Provision for credit losses	1,448	117	–	–	299	–	1,864	1,512	282	70
Insurance policyholder benefits, claims and acquisition expense	–	–	4,085	–	–	–	4,085	2,800	–	1,285
Non-interest expense	7,768	8,813	606	1,725	5,096	131	24,139	12,175	7,994	3,970
Net income (loss) before income taxes	8,649	3,213	1,019	620	2,893	(480)	15,914	11,925	2,193	1,796
Income taxes (recoveries)	2,247	663	213	145	227	(452)	3,043	2,748	133	162
Net income	$ 6,402	$ 2,550	$ 806	$ 475	$ 2,666	$ (28)	$ 12,871	$ 9,177	$ 2,060	$ 1,634
Non-interest expense includes:										
Depreciation and amortization	$ 632	$ 593	$ 48	$ 143	$ 408	$ –	$ 1,824	$ 1,176	$ 486	$ 162
Impairment of other intangibles	–	–	–	44	2	64	110	20	54	36
Total assets	$ 481,720	$ 106,579	$ 19,012	$ 144,406	$ 634,313	$ 42,905	$ 1,428,935	$ 753,142	$ 399,792	$ 276,001
Total assets include:										
Additions to premises and equipment and intangibles	$ 408	$ 565	$ 44	$ 142	$ 491	$ 621	$ 2,271	$ 1,326	$ 669	$ 276
Total liabilities	$ 481,745	$ 106,770	$ 19,038	$ 144,378	$ 634,126	$ (40,747)	$ 1,345,310	$ 669,543	$ 399,800	$ 275,967

(Millions of Canadian dollars)	For the year ended October 31, 2018									
	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), (3)	$ 11,776	$ 2,602	$ –	$ 297	$ 3,328	$ (51)	$ 17,952	$ 13,076	$ 3,616	$ 1,260
Non-interest income (3)	5,140	8,324	4,279	2,294	5,070	(483)	24,624	12,698	6,080	5,846
Total revenue	16,916	10,926	4,279	2,591	8,398	(534)	42,576	25,774	9,696	7,106
Provision for credit losses	1,273	(15)	–	1	48	–	1,307	1,259	41	7
Insurance policyholder benefits, claims and acquisition expense	–	–	2,676	–	–	–	2,676	1,347	–	1,329
Non-interest expense	7,526	8,070	602	1,617	4,960	58	22,833	11,634	7,322	3,877
Net income (loss) before income taxes	8,117	2,871	1,001	973	3,390	(592)	15,760	11,534	2,333	1,893
Income taxes (recoveries)	2,089	606	226	232	613	(437)	3,329	2,661	402	266
Net income	$ 6,028	$ 2,265	$ 775	$ 741	$ 2,777	$ (155)	$ 12,431	$ 8,873	$ 1,931	$ 1,627
Non-interest expense includes:										
Depreciation and amortization	$ 579	$ 544	$ 36	$ 124	$ 363	$ –	$ 1,646	$ 1,102	$ 389	$ 155
Impairment of other intangibles	–	–	–	1	1	4	6	4	1	1
Total assets	$ 453,879	$ 93,063	$ 16,210	$ 136,030	$ 590,950	$ 44,602	$ 1,334,734	$ 680,276	$ 384,921	$ 269,537
Total assets include:										
Additions to premises and equipment and intangibles	$ 279	$ 431	$ 45	$ 187	$ 442	$ 579	$ 1,963	$ 1,196	$ 503	$ 264
Total liabilities	$ 453,878	$ 93,162	$ 16,289	$ 135,944	$ 590,582	$ (35,076)	$ 1,254,779	$ 600,619	$ 384,816	$ 269,344

(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.
(3) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.

Note 29 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 29 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, 2019									
	Canada	%	United States	%	Europe	%	Other International	%	Total	
On-balance sheet assets other than derivatives (1)	$ 646,567	69%	$ 189,240	20%	$ 60,554	6%	$ 50,642	5%	$ 947,003	
Derivatives before master netting agreements (2), (3)	19,544	19%	23,250	23%	53,752	52%	6,421	6%	102,967	
	$ 666,111	64%	$ 212,490	20%	$ 114,306	11%	$ 57,063	5%	$ 1,049,970	
Off-balance sheet credit instruments (4)										
Committed and uncommitted (5)	$ 367,907	67%	$ 148,326	27%	$ 29,462	5%	$ 5,774	1%	$ 551,469	
Other	67,410	58%	15,246	13%	31,934	28%	1,491	1%	116,081	
	$ 435,317	65%	$ 163,572	25%	$ 61,396	9%	$ 7,265	1%	$ 667,550	

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2018									
	Canada	%	United States	%	Europe	%	Other International	%	Total	
On-balance sheet assets other than derivatives (1)	$ 594,823	66%	$ 184,040	21%	$ 60,645	7%	$ 50,486	6%	$ 889,994	
Derivatives before master netting agreements (2), (3)	18,364	19%	20,053	21%	50,767	53%	6,063	7%	95,247	
	$ 613,187	62%	$ 204,093	21%	$ 111,412	11%	$ 56,549	6%	$ 985,241	
Off-balance sheet credit instruments (4)										
Committed and uncommitted (5)	$ 345,545	66%	$ 142,692	27%	$ 31,530	6%	$ 7,140	1%	$ 526,907	
Other	79,399	61%	14,852	11%	34,849	27%	987	1%	130,087	
	$ 424,944	65%	$ 157,544	24%	$ 66,379	10%	$ 8,127	1%	$ 656,994	

(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, 2018 – 54%), the Prairies at 16% (October 31, 2018 – 18%), British Columbia and the territories at 14% (October 31, 2018 – 14%) and Quebec at 10% (October 31, 2018 – 10%). No industry accounts for more than 35% (October 31, 2018 – 32%) of total on-balance sheet credit instruments. The classification of our sectors aligns with our view of credit risk by industry. Sectors have been revised from those previously presented.
(2) A further breakdown of our derivative exposures by risk rating and counterparty type is provided in Note 8.
(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 43% and 57% of our total commitments (October 31, 2018 – 42% and 58%). The largest concentrations in the wholesale portfolio relate to Financial services at 13% (October 31, 2018 – 14%), Utilities at 11% (October 31, 2018 – 11%), Real estate & related at 9% (October 31, 2018 – 9%), Other services at 7% (October 31, 2018 – 8%), and Oil & gas at 7% (October 31, 2018 – 7%). The classification of our sectors aligns with our view of credit risk by industry. Sector percentages have been revised from those previously presented.

Note 30 Capital management

Regulatory capital and capital ratios

OSFI formally establishes risk-based capital and leverage targets 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 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 CET1, additional Tier 1 capital and Tier 2 capital.

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 2019 and 2018, we complied with all Pillar 1 capital and leverage requirements, including the domestic stability buffer, imposed by OSFI.

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	As at October 31 2019	As at October 31 2018
Capital (1)		
CET1 capital	**$ 62,184**	$ 57,001
Tier 1 capital	**67,861**	63,279
Total capital	**77,888**	72,494
Risk-weighted Assets (RWA) used in calculation of capital ratios (1), (2)		
CET1 capital RWA	**$ 512,856**	$ 495,528
Tier 1 capital RWA	**512,856**	495,993
Total capital RWA	**512,856**	496,459
Total capital RWA consisting of: (1)		
Credit risk	**$ 417,835**	$ 401,534
Market risk	**28,917**	32,209
Operational risk	**66,104**	62,716
Total capital RWA	**$ 512,856**	$ 496,459
Capital ratios and Leverage ratio (1)		
CET1 ratio	**12.1%**	11.5%
Tier 1 capital ratio	**13.2%**	12.8%
Total capital ratio	**15.2%**	14.6%
Leverage ratio	**4.3%**	4.4%
Leverage ratio exposure (billions)	**$ 1,570**	$ 1,451

(1) Capital, RWA, and capital ratios are calculated using OSFI's CAR guideline based on the Basel III framework. The Leverage ratio is calculated using OSFI Leverage Requirements Guideline based on the Basel III framework.
(2) In fiscal 2018, amounts included CVA scalars of 80%, 83% and 86%, respectively.

Note 31 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.

The tables below 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 assets subject to offsetting, enforceable master netting arrangements or similar agreements

	As at October 31, 2019							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial assets before balance sheet offsetting	Amounts of financial liabilities offset on the balance sheet	Net amount of financial assets presented on the balance sheet	Impact of master netting agreements	Financial collateral received (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Assets purchased under reverse repurchase agreements and securities borrowed	$ 374,617	$ 69,420	$ 305,197	$ 527	$ 303,539	$ 1,131	$ 1,764	$ 306,961
Derivative assets (3)	88,996	710	88,286	62,524	15,458	10,304	13,274	101,560
Other financial assets	994	281	713	1	89	623	–	713
	$ 464,607	$ 70,411	$ 394,196	$ 63,052	$ 319,086	$ 12,058	$ 15,038	$ 409,234

	As at October 31, 2018							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial assets before balance sheet offsetting	Amounts of financial liabilities offset on the balance sheet	Net amount of financial assets presented on the balance sheet	Impact of master netting agreements	Financial collateral received (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Assets purchased under reverse repurchase agreements and securities borrowed	$ 312,392	$ 18,379	$ 294,013	$ 481	$ 292,412	$ 1,120	$ 589	$ 294,602
Derivative assets (3)	81,770	583	81,187	57,010	14,720	9,457	12,852	94,039
Other financial assets (4)	1,636	814	822	–	244	578	–	822
	$ 395,798	$ 19,776	$ 376,022	$ 57,491	$ 307,376	$ 11,155	$ 13,441	$ 389,463

(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 $11.6 billion (October 31, 2018 – $10.7 billion) and non-cash collateral of $307.5 billion (October 31, 2018 – $296.7 billion).
(3) Includes cash margin of $3.6 billion (October 31, 2018 – $2.2 billion) which offset against the derivative balance on the balance sheet.
(4) Amounts have been revised from those previously presented.

Financial liabilities subject to offsetting, enforceable master netting arrangements or similar agreements

	As at October 31, 2019							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	**Gross amounts of financial liabilities before balance sheet offsetting**	**Amounts of financial assets offset on the balance sheet**	**Net amount of financial liabilities presented on the balance sheet**	**Impact of master netting agreements**	**Financial collateral pledged** (2)	**Net amount**	**Amounts not subject to enforceable netting arrangements**	**Total amount recognized on the balance sheet**
Obligations related to assets sold under repurchase agreements and securities loaned	**$ 294,758**	**$ 69,420**	**$ 225,338**	**$ 527**	**$ 224,506**	**$ 305**	**$ 1,248**	**$ 226,586**
Derivative liabilities (3)	**84,624**	**710**	**83,914**	**62,524**	**13,540**	**7,850**	**14,629**	**98,543**
Other financial liabilities	**492**	**281**	**211**	**1**	**–**	**210**	**–**	**211**
	$ 379,874	**$ 70,411**	**$ 309,463**	**$ 63,052**	**$ 238,046**	**$ 8,365**	**$ 15,877**	**$ 325,340**

	As at October 31, 2018							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial liabilities before balance sheet offsetting	Amounts of financial assets offset on the balance sheet	Net amount of financial liabilities presented on the balance sheet	Impact of master netting agreements	Financial collateral pledged (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Obligations related to assets sold under repurchase agreements and securities loaned	$ 225,193	$ 18,379	$ 206,814	$ 481	$ 206,106	$ 227	$ –	$ 206,814
Derivative liabilities (3)	76,877	583	76,294	57,010	11,446	7,838	13,944	90,238
Other financial liabilities (4)	991	814	177	–	–	177	–	177
	$ 303,061	$ 19,776	$ 283,285	$ 57,491	$ 217,552	$ 8,242	$ 13,944	$ 297,229

(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 $11.5 billion (October 31, 2018 – $11.1 billion) and non-cash collateral of $226.5 billion (October 31, 2018 – $206.5 billion).
(3) Includes cash margin of $1.3 billion (October 31, 2018 – $2.3 billion) which offset against the derivative balance on the balance sheet.
(4) Amounts have been revised from those previously presented.

Note 32 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, 2019			October 31, 2018		
(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)	$ 24,822	$ 1,488	$ 26,310	$ 28,583	$ 1,626	$ 30,209
Interest-bearing deposits with banks	38,345	–	38,345	36,471	–	36,471
Securities						
Trading (2)	137,772	8,762	146,534	121,152	7,106	128,258
Investment, net of applicable allowance	17,283	85,187	102,470	16,795	77,813	94,608
Assets purchased under reverse repurchase agreements and securities borrowed	306,828	133	306,961	294,049	553	294,602
Loans						
Retail	108,382	317,704	426,086	97,414	302,038	399,452
Wholesale	48,737	147,133	195,870	43,280	136,998	180,278
Allowance for loan losses			(3,100)			(2,912)
Segregated fund net assets	–	1,663	1,663	–	1,368	1,368
Other						
Customers' liability under acceptances	18,062	–	18,062	15,635	6	15,641
Derivatives (2)	99,792	1,768	101,560	91,833	2,206	94,039
Premises and equipment	–	3,191	3,191	–	2,832	2,832
Goodwill	–	11,236	11,236	–	11,137	11,137
Other intangibles	–	4,674	4,674	–	4,687	4,687
Other assets	38,775	10,298	49,073	33,578	10,486	44,064
	$ 838,798	$ 593,237	$ 1,428,935	$ 778,790	$ 558,856	$ 1,334,734
Liabilities						
Deposits (3), (4)	$ 719,933	$ 166,072	$ 886,005	$ 669,682	$ 166,515	$ 836,197
Segregated fund net liabilities	–	1,663	1,663	–	1,368	1,368
Other						
Acceptances	18,091	–	18,091	15,657	5	15,662
Obligations related to securities sold short	32,668	2,401	35,069	29,725	2,522	32,247
Obligations related to assets sold under repurchase agreements and securities loaned	226,582	4	226,586	206,813	1	206,814
Derivatives (2)	97,415	1,128	98,543	88,112	2,126	90,238
Insurance claims and policy benefit liabilities	1,726	9,675	11,401	1,691	8,309	10,000
Other liabilities (4)	41,612	16,525	58,137	36,906	16,216	53,122
Subordinated debentures	1,999	7,816	9,815	103	9,028	9,131
	$1,140,026	$ 205,284	$ 1,345,310	$ 1,048,689	$ 206,090	$ 1,254,779

(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. Non-trading derivatives are presented according to the recovery or settlement of the hedging transaction.
(3) Demand deposits of $405 billion (October 31, 2018 – $382 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.
(4) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

Note 33 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

(Millions of Canadian dollars)	As at October 31 2019	As at October 31 2018
Assets		
Cash and due from banks	$ **14,264**	$ 16,398
Interest-bearing deposits with banks	**22,279**	20,261
Securities	**118,716**	111,072
Investments in bank subsidiaries and associated corporations (1)	**37,234**	34,547
Investments in other subsidiaries and associated corporations	**73,785**	69,063
Assets purchased under reverse repurchase agreements and securities borrowed	**123,755**	107,941
Loans, net of allowance for loan losses	**526,078**	494,922
Net balances due from bank subsidiaries (1)	**–**	4,329
Other assets	**152,422**	137,821
	$ **1,068,533**	$ 996,354
Liabilities and shareholders' equity		
Deposits (2)	$ **681,509**	$ 642,271
Net balances due to bank subsidiaries (1)	**2,678**	–
Net balances due to other subsidiaries	**36,594**	38,985
Other liabilities (2)	**254,678**	226,475
	975,459	907,731
Subordinated debentures	**9,551**	8,762
Shareholders' equity	**83,523**	79,861
	$ **1,068,533**	$ 996,354

(1) Bank refers primarily to regulated deposit-taking institutions and securities firms.
(2) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.

Condensed Statements of Income and Comprehensive Income

(Millions of Canadian dollars)	For the year ended October 31 2019	For the year ended October 31 2018
Interest income (1)	$ **27,630**	$ 22,578
Interest expense (2)	**14,966**	10,662
Net interest income	**12,664**	11,916
Non-interest income (2), (3)	**5,569**	6,119
Total revenue	**18,233**	18,035
Provision for credit losses	**1,730**	1,294
Non-interest expense	**9,212**	9,085
Income before income taxes	**7,291**	7,656
Income taxes	**1,568**	1,546
Net income before equity in undistributed income of subsidiaries	**5,723**	6,110
Equity in undistributed income of subsidiaries	**7,137**	6,321
Net income	$ **12,860**	$ 12,431
Other comprehensive income (loss), net of taxes	**(1,441)**	1,532
Total comprehensive income	$ **11,419**	$ 13,963

(1) Includes dividend income from investments in subsidiaries and associated corporations of $27 million (October 31, 2018 – $12 million).
(2) Commencing Q4 2019, the interest component of the valuation of certain deposits carried at FVTPL previously presented in trading revenue is presented in net interest income. Comparative amounts have been reclassified to conform with this presentation.
(3) Includes a nominal share of profit (losses) from associated corporations (October 31, 2018 – $(31) million).

Condensed Statements of Cash Flows

(Millions of Canadian dollars)	For the year ended October 31 2019	October 31 2018
Cash flows from operating activities		
Net income	$ 12,860	$ 12,431
Adjustments to determine net cash from operating activities:		
Change in undistributed earnings of subsidiaries	(7,137)	(6,321)
Change in deposits, net of securitizations (1)	39,238	38,331
Change in loans, net of securitizations	(31,744)	(26,281)
Change in trading securities	2,350	3,730
Change in obligations related to assets sold under repurchase agreements and securities loaned	12,449	49,811
Change in assets purchased under reverse repurchase agreements and securities borrowed	(15,814)	(58,326)
Change in obligations related to securities sold short	797	2,600
Other operating activities, net (1)	(8,149)	763
Net cash from (used in) operating activities	4,850	16,738
Cash flows from investing activities		
Change in interest-bearing deposits with banks	(2,018)	603
Proceeds from sales and maturities of investment securities	37,963	30,355
Purchases of investment securities	(39,461)	(32,561)
Net acquisitions of premises and equipment and other intangibles	(1,266)	(1,173)
Change in cash invested in subsidiaries	332	93
Change in net funding provided to subsidiaries	4,616	(3,363)
Net cash from (used in) investing activities	166	(6,046)
Cash flows from financing activities		
Issue of subordinated debentures	1,500	–
Repayment of subordinated debentures	(1,100)	–
Issue of common shares, net of issuance costs	105	72
Common shares purchased for cancellation	(1,030)	(1,522)
Issue of preferred shares, net of issuance costs	350	–
Redemption of preferred shares	(950)	(105)
Dividends paid	(6,025)	(5,640)
Net cash from (used in) financing activities	(7,150)	(7,195)
Net change in cash and due from banks	(2,134)	3,497
Cash and due from banks at beginning of year	16,398	12,901
Cash and due from banks at end of year	$ 14,264	$ 16,398
Supplemental disclosure of cash flow information		
Amount of interest paid (1)	$ 14,574	$ 9,475
Amount of interest received	25,883	20,490
Amount of dividends received	1,694	1,414
Amount of income taxes paid	1,789	3,562

(1) 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, is presented in net interest income and other liabilities respectively. Comparative amounts have been reclassified to conform with this presentation.

Condensed Balance Sheets

(Millions of Canadian dollars) (1)	2019	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010
					IFRS					CGAAP	
Assets											
Cash and due from banks	$ **26,310**	$ 30,209	$ 28,407	$ 14,929	$ 12,452	$ 17,421	$ 15,550	$ 12,428	$ 12,428	$ 13,247	$ 8,440
Interest-bearing deposits with banks	**38,345**	36,471	32,662	27,851	22,690	8,399	9,039	10,246	6,460	12,181	13,254
Securities, net of applicable allowance (2)	**249,004**	222,866	218,379	236,093	215,508	199,148	182,710	161,602	167,022	179,558	183,519
Assets purchased under reverse repurchase agreements and securities borrowed	**306,961**	294,602	220,977	186,302	174,723	135,580	117,517	112,257	84,947	84,947	72,698
Loans net of allowance	**618,856**	576,818	542,617	521,604	472,223	435,229	408,850	378,241	347,530	296,284	273,006
Other	**189,459**	173,768	169,811	193,479	176,612	144,773	126,079	149,180	175,446	165,485	175,289
Total Assets	**$1,428,935**	$1,334,734	$1,212,853	$1,180,258	$1,074,208	$ 940,550	$ 859,745	$ 823,954	$ 793,833	$ 751,702	$ 726,206
Liabilities											
Deposits (3)	$ **886,005**	$ 836,197	$ 789,036	$ 757,589	$ 697,227	$ 614,100	$ 563,079	$ 512,244	$ 479,102	$ 444,181	$ 414,561
Other (3)	**449,490**	409,451	340,124	341,295	305,675	264,088	239,763	259,174	263,625	256,124	263,030
Subordinated debentures	**9,815**	9,131	9,265	9,762	7,362	7,859	7,443	7,615	8,749	7,749	6,681
Trust capital securities	**–**	–	–	–	–	–	–	–	894	–	727
Non-controlling interest in subsidiaries	**n.a.**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,941	2,256
Total Liabilities	**$1,345,310**	$1,254,779	$1,138,425	$1,108,646	$1,010,264	$ 886,047	$ 810,285	$ 779,033	$ 752,370	$ 709,995	$ 687,255
Equity attributable to shareholders	**83,523**	79,861	73,829	71,017	62,146	52,690	47,665	43,160	39,702	41,707	38,951
Non-controlling interest	**102**	94	599	595	1,798	1,813	1,795	1,761	1,761	n.a.	n.a.
Total equity	**83,625**	79,955	74,428	71,612	63,944	54,503	49,460	44,921	41,463	41,707	38,951
Total liabilities and equity	**$1,428,935**	$1,334,734	$1,212,853	$1,180,258	$1,074,208	$ 940,550	$ 859,745	$ 823,954	$ 793,833	$ 751,702	$ 726,206

Condensed Income Statements

(Millions of Canadian dollars) (1)	2019	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010
					IFRS					CGAAP	
Net interest income (3)	$ **19,749**	$ 17,952	$ 16,926	$ 16,531	$ 14,771	$ 14,116	$ 13,249	$ 12,439	11,357	$ 10,600	$ 10,338
Non-interest income (3), (4)	**26,253**	24,624	23,743	22,264	20,932	19,992	17,433	16,708	16,281	16,830	15,744
Total revenue (4)	**46,002**	42,576	40,669	38,795	35,703	34,108	30,682	29,147	27,638	27,430	26,082
Provision for credit losses (5)	**1,864**	1,307	1,150	1,546	1,097	1,164	1,237	1,299	1,133	975	1,240
Insurance policyholder benefits, claims and acquisition expense	**4,085**	2,676	3,053	3,424	2,963	3,573	2,784	3,621	3,358	3,360	3,546
Non-interest expense (4)	**24,139**	22,833	21,794	20,526	19,020	17,661	16,214	14,641	14,167	14,453	13,469
Non-controlling interest	**n.a.**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	104	99
Net income from continuing operations	**12,871**	12,431	11,469	10,458	10,026	9,004	8,342	7,558	6,970	6,650	5,732
Net loss from discontinued operations	**–**	–	–	–	–	–	–	(51)	(526)	(1,798)	(509)
Net income	$ **12,871**	$ 12,431	$ 11,469	$ 10,458	$ 10,026	$ 9,004	$ 8,342	$ 7,507	6,444	$ 4,852	$ 5,223

Other Statistics – reported

(Millions of Canadian dollars, except percentages and per share amounts) (1)	2019	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010
					IFRS					CGAAP	
PROFITABILITY MEASURES (6)											
Earnings per shares –basic	$ **8.78**	$ 8.39	$ 7.59	$ 6.80	$ 6.75	$ 6.03	$ 5.53	$ 4.96	$ 4.25	$ 3.21	$ 3.49
–diluted	$ **8.75**	$ 8.36	$ 7.56	$ 6.78	$ 6.73	$ 6.00	$ 5.49	$ 4.91	$ 4.19	$ 3.19	$ 3.46
Return on common equity (7), (8)	**16.8%**	17.6%	17.0%	16.3%	18.6%	19.0%	19.7%	19.6%	18.7%	12.9%	14.9%
Return on risk-weighted assets (9)	**2.52%**	2.55%	2.49%	2.34%	2.45%	2.52%	2.67%	2.70%	2.44%	1.87%	2.03%
Efficiency ratio (4)	**52.5%**	53.6%	53.6%	52.9%	53.3%	51.8%	52.8%	50.2%	51.3%	52.7%	51.6%
KEY RATIOS											
PCL on impaired loans as a % of average net loans and acceptances (10)	**0.27%**	0.20%	0.21%	0.28%	0.24%	0.27%	0.31%	0.35%	0.33%	0.34%	0.45%
Net interest margin (average earning assets, net) (3), (7)	**1.61%**	1.64%	1.69%	1.70%	1.71%	1.86%	1.88%	1.97%	1.86%	1.84%	1.99%
SHARE INFORMATION											
Common shares outstanding (000s) – end of period	**1,430,096**	1,438,794	1,452,535	1,484,235	1,443,955	1,443,125	1,441,722	1,445,846	1,438,522	1,438,522	1,423,203
Dividends declared per common share	$ **4.07**	$ 3.77	$ 3.48	$ 3.24	$ 3.08	$ 2.84	$ 2.53	$ 2.28	$ 2.08	$ 2.08	$ 2.00
Dividend yield (11)	**4.1%**	3.7%	3.8%	4.3%	4.1%	3.8%	4.0%	4.5%	3.9%	3.9%	3.6%
Dividend payout ratio	**46%**	45%	46%	48%	46%	47%	46%	46%	45%	47%	52%
Book value per share	$ **54.41**	$ 51.12	$ 46.41	$ 43.32	$ 39.51	$ 33.69	$ 29.87	$ 26.52	$ 24.25	$ 25.65	$ 23.99
Common share price (RY on TSX) (12)	$ **106.24**	$ 95.92	$ 100.87	$ 83.80	$ 74.77	$ 80.01	$ 70.02	$ 56.94	$ 48.62	$ 48.62	$ 54.39
Market capitalization (TSX) (12)	**151,933**	138,009	146,554	124,476	107,925	115,393	100,903	82,296	69,934	69,934	77,502
Market price to book value	**1.95**	1.88	2.17	1.93	1.89	2.38	2.34	2.15	2.00	1.90	2.27
CAPITAL MEASURES – CONSOLIDATED (13)											
Common Equity Tier 1 capital ratio	**12.1%**	11.5%	10.9%	10.8%	10.6%	9.9%	9.6%	n.a.	n.a.	n.a.	n.a.
Tier 1 capital ratio	**13.2%**	12.8%	12.3%	12.3%	12.2%	11.4%	11.7%	13.1%	n.a.	13.3%	13.0%
Total capital ratio	**15.2%**	14.6%	14.2%	14.4%	14.0%	13.4%	14.0%	15.1%	n.a.	15.3%	14.4%
Leverage Ratio	**4.3%**	4.4%	4.4%	4.4%	4.3%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(1) 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 2019 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 2019 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) Ratios for 2010-2012 represent continuing operations.

(7) 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.

(8) These measures 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.

(9) Return on risk-weighted assets (RWA) for fiscal 2011 is based on RWA reported under Canadian Generally Accepted Accounting Policies (CGAAP) and Income reported under IFRS.

(10) 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.

(11) Defined as dividends per common share divided by the average of the high and low share price in the relevant period.

(12) Based on TSX closing market price at period-end.

(13) Effective 2013, we calculated the capital and leverage ratios using the Basel III framework unless otherwise stated. 2010-2012 capital and leverage ratios were calculated using the Basel II framework. Capital and leverage ratios for 2011 were determined under CGAAP and Basel II framework.

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, as at October 31, 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, as at October 31, 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
Average earning assets include interest-bearing deposits with other banks including certain components of cash and due from banks, securities, assets purchased under reverse repurchase agreements and securities borrowed, loans, and excludes segregated fund net assets and other assets. 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.

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.

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.

Homeline products
This is comprised of residential mortgages and secured personal loans whereby the borrower pledges real estate as collateral.

International Financial Reporting Standards (IFRS)
IFRS are principles-based standards, interpretations and the framework adopted by the International Accounting Standards Board.

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.

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 homeline 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)
Calculated as net interest income divided by average earning assets.

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, note issuances and revolving underwriting facilities, 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.

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 guidelines issued by OSFI. For more details, refer to the Capital management section.

Securities lending
Transactions in which the owner of a security agrees to lend it under the terms of a prearranged contract to a borrower for a fee. The borrower must collateralize the security loan at all times. An intermediary such as a bank often acts as agent for the owner of the security. There are two types of securities lending arrangements: lending with and without credit or market risk indemnification. In securities lending without indemnification, the bank bears no risk of loss. For transactions in which the bank provides an indemnification, it bears the risk of loss if the borrower defaults and the value of the collateral declines concurrently.

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.

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.

Standardized Approach
Risk weights prescribed by OSFI are used to calculate risk-weighted assets 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.

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, innovative instruments 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 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.

Principal subsidiaries

(Millions of Canadian dollars)		As at October 31, 2019
Principal subsidiaries (1)	Principal office address (2)	Carrying value of voting shares owned by the Bank (3)
Royal Bank Holding Inc.	Toronto, Ontario, Canada	$ 65,288
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.	St. Michael, Barbados	
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 US Group Holdings LLC (2)	Toronto, Ontario, Canada	22,329
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	10,068
RBC Dominion Securities Inc.	Toronto, Ontario, Canada	
RBC Finance S.à r.l./B.V. (2)	Amsterdam, Netherlands	2,907
RBC Holdings (Luxembourg) S.A R.L.	Luxembourg, Luxembourg	
RBC Holdings (Channel Islands) Limited	Jersey, Channel Islands	
Royal Bank of Canada (Channel Islands) Limited	Guernsey, Channel Islands	
RBC Europe Limited	London, England	2,570
Royal Bank Mortgage Corporation	Toronto, Ontario, Canada	1,321
The Royal Trust Company	Montreal, Quebec, Canada	858
Royal Trust Corporation of Canada	Toronto, Ontario, Canada	298

(1) The Bank directly or indirectly controls each subsidiary.
(2) Each subsidiary is incorporated or organized under the law of the state or country in which the principal office is situated, except for RBC US Group Holdings LLC and RBC USA Holdco Corporation which are incorporated under the laws of the State of Delaware, U.S., RBC Capital Markets, LLC, which is organized under the laws of the State of Minnesota, U.S., and RBC Finance S.à r.l. / B.V. which is a company incorporated in the Netherlands with its official seat in Amsterdam, the Netherlands, and place of effective management, central administration, and principal establishment in Luxembourg, Grand Duchy of Luxembourg.
(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)

All preferred shares are listed on the TSX with the exception of the series C-2. 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

For other shareholder inquiries, please contact:
Shareholder Relations
Royal Bank of Canada
200 Bay Street
South Tower
Toronto, Ontario M5J 2J5
Canada
Tel: 416-955-7806

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: 416-955-7802
or visit our website at rbc.com/investorrelations

Direct deposit service
Shareholders in Canada and the U.S. may have their RBC 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 20 million common shares during the period spanning from March 1, 2019 to February 29, 2020, when the bid expires, or such earlier date as we may complete the purchases pursuant to our Notice of Intention filed with the Toronto Stock Exchange.

We determine the amount and timing of the purchases under the NCIB, subject to prior consultation with the Office of the Superintendent of Financial Institutions Canada.

A copy of our Notice of Intention to file a NCIB may be obtained, without charge, by contacting our Corporate Secretary at our Toronto mailing address.

2020 Quarterly earnings release dates

First quarter	February 21
Second quarter	May 27
Third quarter	August 26
Fourth quarter	December 2

2020 Annual Meeting
The Annual Meeting of Common Shareholders will be held on Wednesday, April 8, 2020, at 9:30 a.m. (Eastern Time) at the Metro Toronto Convention Centre, 255 Front Street West, Toronto, Ontario, Canada

Dividend dates for 2020
Subject to approval by the Board of Directors

	Record dates	Payment dates
Common and preferred shares series W, AA, AC, AE, AF, AG, AZ, BB, BD, BF, BH, BI, BJ, BK, BM and BO	January 27 April 23 July 27 October 26	February 24 May 22 August 24 November 24
Preferred shares series C-2 (US$)	January 28 April 27 July 28 October 27	February 7 May 7 August 7 November 6

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.

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Exhibit 3

Consent of Independent Registered Public Accounting Firm

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 Nos. 333-12036, 333-12050, 333-13052, 333-13112, 333-14144, 333-117922, 333-178350, 333-207754, 333-207750, 333-207748 and 333-211680, and on Form F-3 No. 333-227001 of Royal Bank of Canada of our Report of Independent Registered Public Accounting Firm dated December 3, 2019 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 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
December 4, 2019

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 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 reprisal.

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 stakeholders — 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 ensuring our strong reputation for doing what's right.

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Publication date: January 1, 2019

1. Our Culture of Integrity

1.1 Living Our Values and Acting with Integrity

RBC is a values-based organization. Respect for each other, RBC clients and our commitments to all our stakeholders 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 and affiliates.

1.2 Our Culture of Integrity — Doing What's Right

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. These behaviours are the foundation for our culture of integrity and doing what's right.

For resources and information on our culture of integrity, 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, 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, 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.

1.3 Our Shared Commitment and Accountability
The Code applies to all RBC employees, contract workers and members of the boards of directors.

Understanding and complying with the Code is a condition of our work at RBC, and critical to earning the trust RBC clients and communities have placed in us. 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 suppliers to follow similar principles and share our commitment to ethics and integrity as set out in our Supplier Code of Conduct.

Approval of the Code
The RBC Board of Directors approves the Code.

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 or specified executive officers must be approved by Royal Bank of Canada's Board of Directors (or a designated Board committee). Approved waivers must be disclosed publicly as required by law and RBC policies.

2. Speaking Up, Raising Concerns and Reporting Misconduct

Our shared commitment and accountability involve more than just personally complying with the Code and acting with integrity. At RBC, we have a responsibility to seek guidance and raise concerns about compliance with the Code, RBC policies and the law, and a duty to report misconduct. 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.

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 fair and ethical?
- 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 and Raising Concerns

We ensure that all questions and concerns raised are addressed. While the Code and RBC policies outline the ethical behaviour expected of us, they cannot anticipate every situation we encounter. By speaking up and raising our concerns, we ensure RBC does the right thing and we protect our clients' interests and assets, and RBC's reputation.

2.2 Reporting Misconduct

We have a duty to report actual, or possible, misconduct that we become aware of, even our own. RBC provides a number of internal and external reporting options. We can notify our managers, senior management or any of the Key Contacts of acts that are, or may be, in violation of the Code, policies and laws, or are otherwise unethical and could put RBC at risk of loss or harm.

All reports of misconduct are investigated promptly and thoroughly, as appropriate. RBC must keep the identity of the person making the report and the details confidential, and will only disclose information to the extent necessary to investigate and address the situation or as legally required.

Refer to RBC's Standards on Reporting Misconduct for further details.

Some examples of misconduct are:

- deliberate failure to comply with policies, management instructions or the law
- disrespectful behaviour, discrimination, harassment, 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

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 one of the Key Contacts before providing information.

2.4 RBC's Commitment to Non-Retaliation

There will be no retaliation for speaking up and making a truthful report of actual or possible misconduct, for participating in an investigation or for exercising our legal rights. Retaliation can include behaviour or actions that punish or deter someone from speaking up. Retaliation can be an unjustified decision affecting someone's compensation, job security, career mobility or performance rating, and can also include unnecessarily monitoring someone's work, excluding them from meetings or team events and withholding work-related information. If you believe you've encountered any form of retaliation, follow the reporting procedures set out in the Respectful Workplace Policy 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 activities that are not retaliation:

- 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 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
- maintaining an environment that prohibits retaliation, where everyone feels safe to ask questions, raise concerns and report misconduct, while 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.

Our integrity underpins everything we do. **It is the foundation for the way we deal with our clients and communities, work with our partners for a stronger RBC, conduct our many businesses and safeguard our assets. The Code explains how we maintain our culture of doing what's right – a culture that makes RBC trusted and successful.**

3. Integrity in Dealing with RBC Clients, Communities and Others

We are committed to promoting fairness in our dealings with our clients, shareholders, suppliers and others, carefully weighing our responsibilities to all stakeholders.

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, improper disclosure or misuse. We do this by complying with RBC's Enterprise Privacy Risk Management Policy. We must also never share non-public client information — accidentally or intentionally — with a third party or colleague who does not have a business need to know. We are responsible for keeping RBC client information private, even after we leave RBC's service.

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 RBC's 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?

- 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.
- When working in public places (for example, while commuting, in restaurants or in hotels) take care not to be overheard or allow RBC business or client information to be visible or left behind.
- Dispose of confidential information securely.
- Immediately report any potential or actual privacy or information security incidents or breaches.
- Never forward business or client information to your non-RBC personal email address.

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 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 use of external social media**
  One of the ways RBC communicates is through social media. To ensure that our business and corporate social media use is appropriate and consistent with RBC's general communication strategy, only specifically approved employees may participate in the external social media channels approved by their business unit. Refer to the RBC Enterprise Policy on the Use of External Social Media, which includes links to additional business specific documents.

- **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 stakeholders, our clients or our competition. If we have concerns, we should speak to our manager or one of the Key Contacts. For more guidance on personal use of social media, refer to RBC's Enterprise Guidelines for Personal Use of Social Media.

When using any social media platform, remember that our comments are public and permanent. We should consider the following do's and don'ts when using social media:

- Do not post on social media if our personal and professional reputations, or the reputation of RBC, may be negatively impacted.
- Do not post photos of our colleagues without prior consent.
- Do not 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.
- Do not try to address an issue involving RBC unfolding in social media, or speak on RBC's behalf, unless authorized to by Corporate Communications and our manager.
- Do contact socialmedia@rbc.com.

- **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 referred to our Corporate Communications representatives; we are not authorized to address media questions ourselves. For more information, refer to RBC's Media and Communications Policy.

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 Control Standards for Outside Business Activities 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 by employees of companies that have or may have business before a particular local government. Therefore, it is advisable to refer to the RBC Enterprise Lobbying Policy and applicable procedures before making a political contribution.

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 follow the procedures established for our business unit. This includes escalating the inquiry to our manager or local Compliance group, as appropriate, for response.

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 ensures 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 behaviour that, because of its nature or persistence, interferes with a climate of mutual respect for the dignity and worth of each person. It also undermines 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 offensive material.

Refer to RBC's Respectful Workplace Policy for details and procedures for reporting breaches.

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.

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
- sexist behaviour that represents a belief one sex 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.

Speak UP!

- If you witness or experience inappropriate behaviour, you have a responsibility to speak up.
- Early, informal and direct communication with the person whose behaviour you feel is inappropriate is encouraged. 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 should raise your concern with a manager or one of the Key Contacts. Refer to Doing What's Right.

Examples of disrespectful and inappropriate behaviour are:

- swearing
- making demeaning comments, gestures, pranks or jokes
- circulating derogatory or offensive pictures, posters or communications, and yelling.

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 regarding non-discrimination and human rights in the jurisdictions where we operate. 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, sex, 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 doesn't differentiate unfairly.

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. Collection, use and disclosure of this information must be relevant to our working relationship with RBC.

Additionally, when someone confides in us and asks us to keep the information confidential, we must do so, except as required by law, the Code or RBC's policies. Keeping information private and confidential is a matter of personal integrity, honouring the trust others place in us. For more information, please refer to RBC's Employee Privacy View.

Personal information about us is used by RBC where needed to manage our working relationships, and must be kept confidential as outlined in RBC's Employee Privacy View. It includes:

- information required to verify credentials and education
- employment-related credit checks
- home address
- home phone number and personal cell phone number
- government-issued identification numbers
- 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 managers, 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.

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 RBC sponsored 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 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 only 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 language
- obtain proper and informed consent in line with RBC's policies.

5.2 Avoiding and Managing Conflicts of Interest

By acting without bias, we can assure RBC stakeholders of our integrity. This means that the decisions we make in our work with RBC must be objective and we put our clients' interests above our personal 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, without bias. Keep in mind that a conflict of interest can exist even where we have not behaved improperly or unethically. Even the impression of a conflict of interest can affect RBC's reputation and our own.

We cannot prevent or avoid all conflicts of interest, as some arise naturally out of our various relationships with RBC, its clients and others. We must manage conflicts that we cannot avoid to ensure objectivity.

We have an ongoing responsibility to identify conflicts of interest in relation to RBC, its clients and its suppliers. This includes potential and perceived conflicts as well as actual ones. We must immediately disclose all conflicts so they can be managed appropriately.

How can I recognize and manage potential conflicts of interest?

- Think about how your actions would look to others.
- Disclose activities upfront, especially if you are unsure about a potential conflict.
- Talk to your manager or local Compliance group if you have any questions.

Some 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.

For more information, refer to RBC's Enterprise Conflicts of Interest Policy and related control standards as well as RBC's Enterprise Anti-Bribery Anti-Corruption Policy. These resources also explain how to disclose actual, potential or perceived conflicts.

Managing our dealings with RBC
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 friends' 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. For more information, we should check with our local Compliance group**.**

Managing personal relationships at work
It is possible for our personal relationships to have an effect on our work at RBC. We must understand the actual or perceived effects that personal relationships can have in order to avoid situations that would reflect negatively on RBC.

What types of close personal relationships could cause a conflict of interest and should be disclosed?

- A supervisory relationship with a family member or someone we are in a close personal relationship with
- Any working relationship with a close friend or family member where we may have, or be perceived to have, the ability to impact their compensation, work conditions or promotion prospects

It's important to identify and disclose potential conflicts of interest that might arise if we work with family or others who we are in a close personal relationship with.

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.

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 supplier. 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 suppliers. In these cases, we must inform our manager or local Compliance group of the potential conflict of interest so it can be addressed.

What are some examples of "close personal relationships"?

- Family
- Romantic or intimate relationships
- Household members such as roommates
- Close friends

Managing outside activities or work
Some of us take on additional work or activities outside our work at RBC. This may take the form of part-time work elsewhere or a personal business run from home. No matter the type of work, it must not be with one of RBC's competitors. Additional work or volunteer activities must not interfere with our responsibilities to RBC or its clients.

We must be aware of actual, potential or perceived conflicts of interest related to outside activities and must disclose and obtain approval for Outside Activities as required. Doing so allows us to maintain our commitment to integrity while maximizing our business and relationships.

Managing external directorships
RBC encourages us to participate in our communities. For example, some of us may choose to take on directorships or similar roles at companies, organizations, clubs, associations or foundations. If we do, the role must not compromise our ability to do our best work for RBC and its clients. We must be careful to avoid actual, potential or perceived conflicts of interest and potential reputational issues. Roles and relationships must be assessed to ensure we comply with the Code and RBC policies on disclosure and approval. Generally, it is not acceptable to act as an officer or director of a client's business.

- For more information on managing outside activities or work and managing external directorships, refer to RBC's Enterprise Conflicts of Interest Policy, Control Standards for Outside Business Activities and Control Standards for External Directorships for the required process and approvals. Non-employee directors of RBC subsidiaries should refer to the *RBC Policy on the Legal Governance of Subsidiaries* and consult the Corporate Secretary of the relevant subsidiary.

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. We must ensure we follow established procedures before accepting any requests, appointments, gifts or benefits by obtaining management and local Compliance approvals appropriate for the business we work in. When acceptance of certain appointments is part of our role (such as being a discretionary investment manager), we must follow RBC policies.

Managing gifts and entertainment
In business, it is common to foster relationships 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 someone else's business judgment. To keep our purposes clear, all gifts and entertainment we accept or give must comply with RBC policies. 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.
- RBC's Control Standards for Gifts and Entertainment set 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 supplier 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.
- Seek guidance from Compliance before providing a gift or entertainment to 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.
- Whether your business unit has specific rules regarding gifts or entertainment.
- 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. For example, if a supplier gives us tickets to an event, but does not attend, we must follow our local business 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. Refer to Control Standards for Gifts and Entertainment or your local business 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 RBC's Enterprise Conflicts of Interest Policy, the Control Standards for Gifts and Entertainment and RBC's Enterprise Anti-Bribery Anti-Corruption Policy. Your business unit may also have more specific rules; for further information you should contact your local Compliance group.

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 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. We must also never advise ('tip-off') anyone we suspect of committing these crimes.

For more information or guidance, please refer to RBC's Enterprise Anti-Money Laundering and Anti-Terrorist Financing Policy, RBC's Enterprise Anti-Bribery Anti-Corruption Policy and RBC's 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**.** Never 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.

Compliance with tax laws
We must not knowingly facilitate tax evasion, either in connection with RBC's corporate tax affairs or in servicing our clients.

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 contact the RBC Taxation Group before proceeding.

5.4 Securities Trading

Many of the countries where we do business have laws regarding when we can trade in securities issued by any company.

Before trading in the securities of RBC, its clients or any other company, we must familiarize ourselves with RBC's policies on personal trading, as well as the effect that the perception of wrongdoing may have.

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. Similarly, a reasonable investor would consider it important when deciding whether to buy, sell or hold onto a security. When we have inside information about a company, 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.

For more information, refer to RBC's Enterprise-wide Policy on Inside Information & Information Barriers and the Enterprise-wide Personal Trading Policy.

- The Board of 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 and its subsidiaries who are not otherwise 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.

5.5 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:

- fix, maintain, increase or try to control the price of a product or service

- divide or allocate sales, clients or markets for the supply of products or services, or
- fix, maintain, increase, lessen, or otherwise try to control the 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 competitor mentions any of these practices, we should voice our disagreement and withdraw from the discussion. 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.

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, or
- 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.

For more information, please refer to RBC's Anti-Trust and Competition Law Policy.

5.6 Global Economic Sanctions

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. Further, we must not knowingly avoid sanction regulations, either personally or in servicing our clients. Contact the RBC Law Group or Global Anti-Money Laundering Compliance 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
- taking advantage of opportunities only available to RBC employees, 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.

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 our 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 and the Internet
Most of the equipment, systems and technologies that we use in our work belong to RBC. This includes RBC computer networks, software, computers and portable devices, as well as the messages communicated with 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 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 business 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 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 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 serious violations 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

Industry Guide 3 - Return on Equity and Assets Ratios

	For the Year-Ended October 2019	For the Year-Ended October 2018	For the Year-Ended October 2017
Return on Assets	0.90%	0.96%	0.97%
Return on Equity	16.8%	17.6%	17.0%
Dividend Payout Ratio	46%	45%	46%
Equity to Asset Ratio	5.64%	5.85%	6.12%

Exhibit 31.1

SOX 302 CERTIFICATION

I, David I. 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.

December 4, 2019

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

Exhibit 31.2

SOX 302 CERTIFICATION

I, Rod Bolger, 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.

December 4, 2019

/s/ Rod Bolger
Name: Rod Bolger
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, 2019 (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: December 4, 2019

/s/ David I. McKay

Name: David I. 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, 2019 (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: December 4, 2019

/s/ Rod Bolger

Name: Rod Bolger
Title: Chief Financial Officer