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.

Table of contents

Caution regarding forward-looking statements **12**

Overview and outlook **13**
- Selected financial and other highlights 13
- About Royal Bank of Canada 14
- Vision and strategic goals 14
- Economic, market and regulatory review and outlook 14
- Defining and measuring success through total shareholder returns 15

Financial performance **16**
- Overview 16
- Impact of foreign currency translation 16
- Total revenue 17
- Provision for credit losses 18
- Insurance policyholder benefits, claims and acquisition expense 18
- Non-interest expense 18
- Income and other taxes 19
- Client assets 19

Business segment results **21**
- Results by business segment 21
- How we measure and report our business segments 21
- Key performance and non-GAAP measures 22
- Personal & Commercial Banking 24
- Wealth Management 28
- Insurance 33
- Investor & Treasury Services 36
- Capital Markets 38
- Corporate Support 42

Quarterly financial information **42**
- Fourth quarter performance 42
- Quarterly results and trend analysis 43

Financial condition **44**
- Condensed balance sheets 44
- Off-balance sheet arrangements 45

Risk management **47**
- Top and emerging risks 47
- Overview 49
- Enterprise risk management 50

Transactional/positional risk drivers **54**
- Credit risk 54
- Market risk 66
- Liquidity and funding risk 71
- Insurance risk 82

Operational/regulatory compliance risk drivers **82**
- Operational risk 82
- Regulatory compliance risk 83

Strategic risk drivers **84**
- Strategic risk 84
- Reputation risk 84
- Legal and regulatory environment risk 85
- Competitive risk 86

Macroeconomic risk drivers **86**
- Systemic risk 86

Overview of other risks **87**

Capital management **90**

Capital, liquidity and other regulatory developments **98**

Accounting and control matters **99**
- Critical accounting policies and estimates 99
- Controls and procedures 102

Related party transactions **102**

Supplementary information **102**

Enhanced Disclosure Task Force recommendations index **110**

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.

Segment	Description
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)	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

	2019							2018
(Millions of Canadian dollars, except percentage amounts)	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	Total	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**

	2017		
		Item excluded	
(Millions of Canadian dollars, except percentage amounts)	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**

	2017		
		Item excluded	
(Millions of Canadian dollars, except percentage amounts)	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**

	2019			2018		
		Item excluded			Item excluded	
(Millions of Canadian dollars, except percentage amounts)	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%

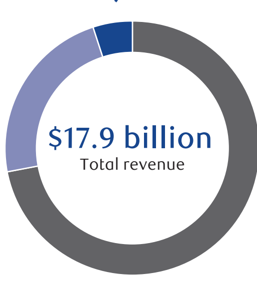
Personal & Commercial Banking provides a broad suite of financial products and services to individuals and businesses for their day-to-day banking, investing and financing needs. We are focused on building meaningful relationships with our clients, underscored by our exceptional client experience, the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



- 72% Personal Banking
- 23% Business Banking
- 5% Caribbean and U.S. Banking

We operate through two businesses – Canadian Banking and Caribbean & U.S. Banking. Canadian Banking serves our home market in Canada, 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.

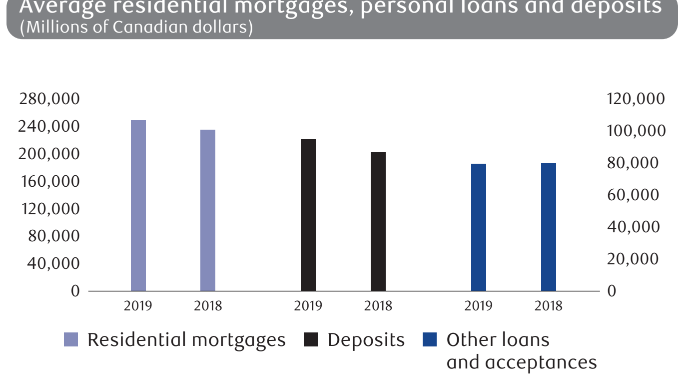
Average deposits increased 9% from last year, largely reflecting acquisitions of new clients and an increase in activity from existing clients.

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.

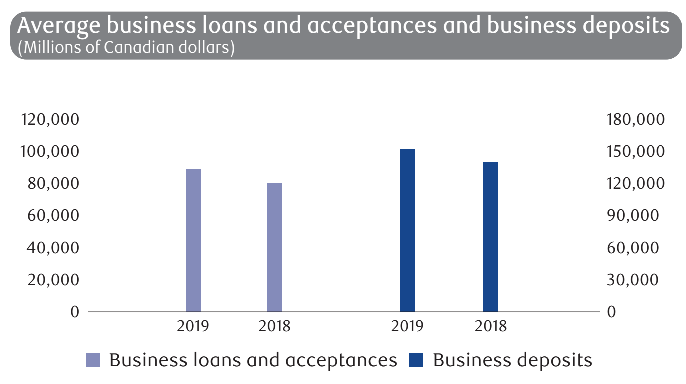
Financial performance
Total revenue increased $318 million or 9% compared to last year, largely reflecting average volume growth of 10%.

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.

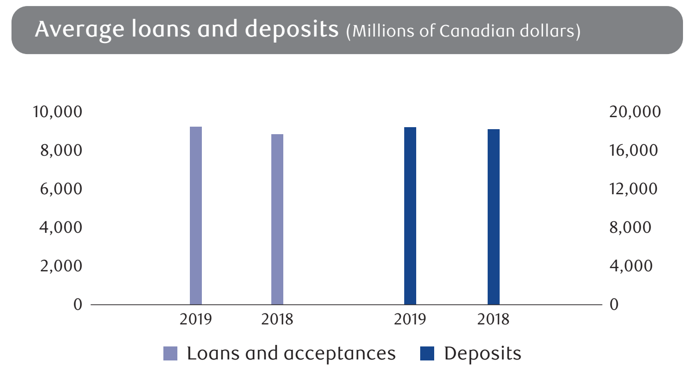
Financial performance
Total revenue was up $25 million or 3% from last year, primarily due to the impact of foreign exchange translation.

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.



Wealth Management

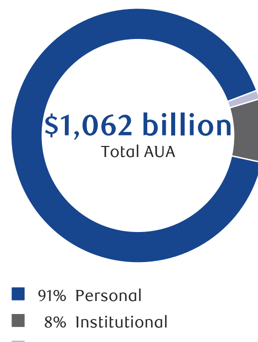
Wealth Management is a global business serving clients in key financial centres. We serve HNW and UHNW individual and institutional clients with a comprehensive suite of advice-based solutions and strategies to help them achieve their financial goals.

$12.1 billion Total revenue

> 5,200 Client-facing advisors

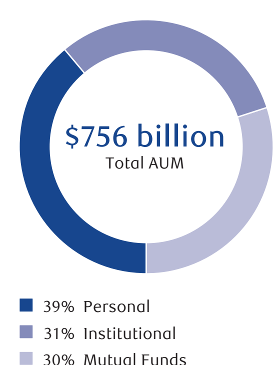
> $22 billion AUA net flows

Assets under Administration (AUA)



- 91% Personal
- 8% Institutional
- 1% Mutual Funds

Assets under Management (AUM)



- 39% Personal
- 31% Institutional
- 30% Mutual Funds

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
	2019					2018
(Millions of Canadian dollars)	Money market	Fixed income	Equity	Multi-asset and other	Total	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.

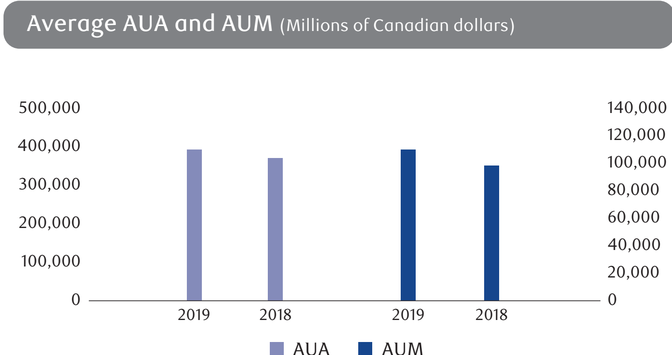
Financial performance
Revenue increased $246 million or 8% from a year ago, primarily due to higher average fee-based client assets reflecting market appreciation and net sales and the impact of a favourable accounting adjustment.

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.

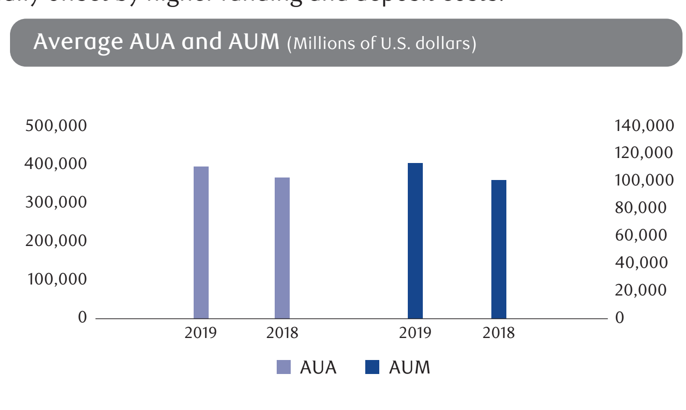
NIM increased 9 bps, mainly due to higher interest rates, partially offset by higher funding and deposit costs.

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.

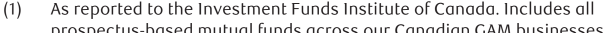
In the U.S., our asset management business offers investment management solutions and services primarily to institutional investors and competes with independent asset management firms, as well as those that are part of national and international banks, and insurance companies.

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.

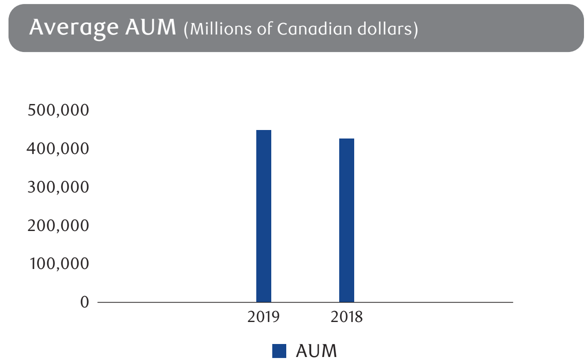
Financial performance
Revenue increased $269 million or 13%, mainly due to a gain on the sale of the private debt business of BlueBay of $151 million as we have focused on growing our core business and complementary strategies, and higher average fee-based client assets reflecting market appreciation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



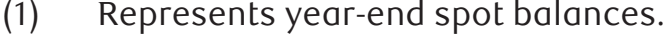
International Wealth Management

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.

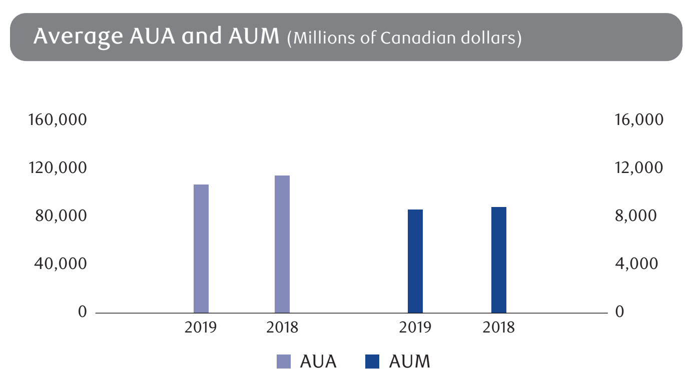
Financial performance
Revenue increased $9 million or 2%, primarily due to an increase in net interest income driven by higher spreads.

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

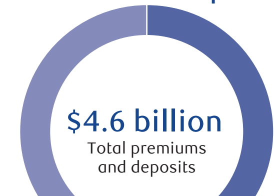
RBC Insurance® offers a wide range of solutions including creditor, life, health, home, auto, travel, wealth, and annuities to individuals as well as reinsurance advice and solutions, and business insurance services to business and group clients.

$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.

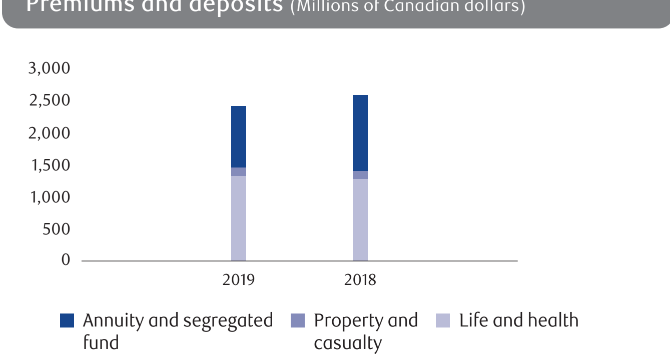
Financial performance

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

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.

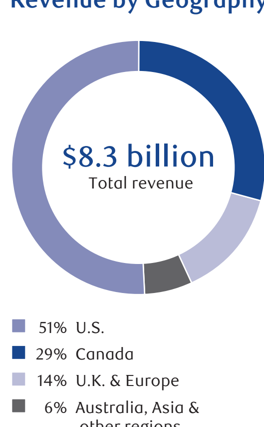
Non-interest expense increased $108 million or 7%, mainly due to severance and related costs associated with repositioning of the business.

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	#10	4,269
Number of clients	Global league rankings[(1)]	Employees

Revenue by Geography



- 51% U.S.
- 29% Canada
- 14% U.K. & Europe
- 6% Australia, Asia & other regions

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

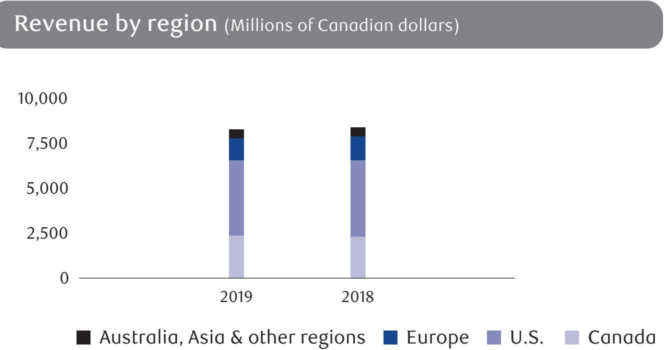
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2019	2018
Net interest income (1), (2)	$ 4,043	$ 3,328
Non-interest income (1), (2)	4,245	5,070
Total revenue (1)	**8,288**	8,398
PCL on performing assets	36	(13)
PCL on impaired assets	263	61
Total PCL	**299**	48
Non-interest 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.

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

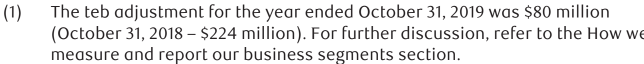
Corporate and Investment Banking revenue of $3,792 million decreased $321 million or 8% as compared to last year.

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.

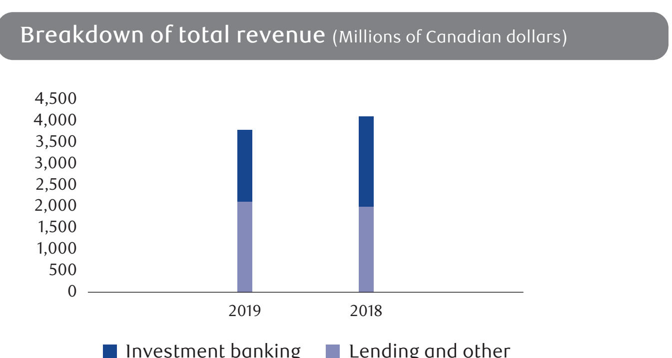
Lending and other revenue increased $114 million or 6%, reflecting the impact of foreign exchange translation, as well as increased client activity mainly in the U.S.

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.

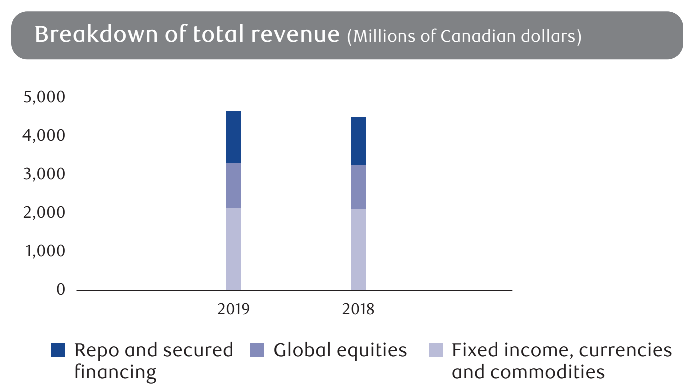
Revenue in our Repo and secured financing business increased $109 million or 9%, mainly due to increased client activity.

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.

Control & Influence: Less (top) → More (bottom)

Category	Description
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.

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.

BOARD OF DIRECTORS

RISK COMMITTEE | AUDIT COMMITTEE | GOVERNANCE COMMITTEE | HUMAN RESOURCES COMMITTEE

- The **Board** establishes the tone from above, approves our risk appetite, provides oversight and carries out its risk management mandate primarily through its committees which include the Risk Committee, the Audit Committee, the Governance Committee and the Human Resources Committee.
- The **Risk Committee** oversees our risk management program by ensuring that the policies, procedures and controls used by management are sufficient to keep risks within our risk appetite. The Risk Committee's oversight role is designed to ensure that the risk management function is adequately independent from the businesses whose activities it reviews. Its oversight activities include the review of the GRM function which evaluates GRM's success against its key priorities, the mandate of the Chief Risk Officer (CRO), the GRM organizational structure, and the function's budget and resources.
- The **Audit Committee** assists the Board in its oversight of (i) the integrity of our financial statements; (ii) the qualifications, performance and independence of our external auditors; (iii) the performance of our internal audit function and internal controls; and (iv) compliance with legal and regulatory requirements.
- The **Governance Committee** recommends individuals for Board member election or re-election, oversees the process for evaluating Board members, and oversees management of conduct, including breaches of the Code of Conduct. Additional responsibilities include (i) developing and recommending governance frameworks, principles and policies to the Board; (ii) overseeing corporate citizenship matters; (iii) monitoring developments in corporate governance and adapting best practices; and (iv) reviewing shareholder proposals and recommending responses to the Board.
- The **Human Resources Committee** assists the Board in its oversight of compensation policies and programs, compensation for the CEO and Group Executives (GE), as well as compensation risk management. It also oversees our pension plans, key talent management strategies and practices, and management succession plans.

GROUP EXECUTIVES AND GROUP RISK COMMITTEE

- Actively shapes enterprise risk appetite and recommends it for Board approval.
- Establishes the tone from above and visibly supports and communicates enterprise risk appetite, ensuring that sufficient resources and expertise are in place to help provide effective oversight of adherence to the enterprise risk appetite.
- Ensures principles, policies, authorities, resources, responsibilities and reporting are in place to support the control infrastructure necessary for an effective enterprise-wide risk management program.
- Oversees conduct and risk culture strategy and key activities.
- The Compensation Risk Management Oversight Committee (CRMOC) oversees the design of major compensation programs to ensure alignment with sound risk management principles and that risks that may not be fully captured in our current financial performance are appropriately considered in variable compensation payouts, including enterprise risk profile relative to risk appetite. The CRMOC ensures our compensation programs align with the Financial Stability Board (FSB) Principles for Sound Compensation Practices and Implementation Standards (FSB Principles) and other applicable guidance and best practices.

FIRST LINE OF DEFENCE

RISK OWNERS

- Employees in the business and support functions embedded in the business
- Accountable for:
  - Identification;
  - Assessment;
  - Mitigation;
  - Monitoring; and
  - Reporting of risk against approved policies and appetite

SECOND LINE OF DEFENCE

RISK OVERSIGHT

RISK MANAGEMENT | GLOBAL COMPLIANCE

- The CRO has direct access to the Risk Committee
- The Chief Compliance Officer (CCO) and the Chief Anti-Money Laundering Officer (CAMLO) have direct access to the Audit Committee
- Establishes risk management practices and provides risk guidance
- Provides oversight of the effectiveness of First Line risk management practices
- Monitors and independently reports on the level of risk against established risk appetite

THIRD LINE OF DEFENCE

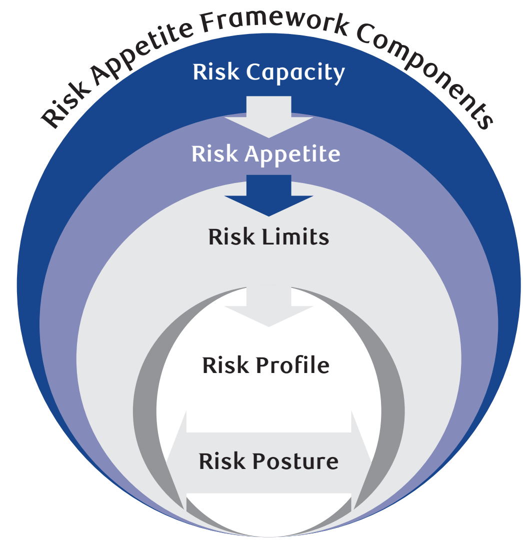
INDEPENDENT ASSURANCE

- Internal Audit
- Independent assurance to management and the Board on the effectiveness of risk management practices

Risk appetite

Effective risk management protects us from unacceptable losses or undesirable outcomes with respect to earnings volatility, capital adequacy or liquidity, 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	Qualitative 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.	• 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

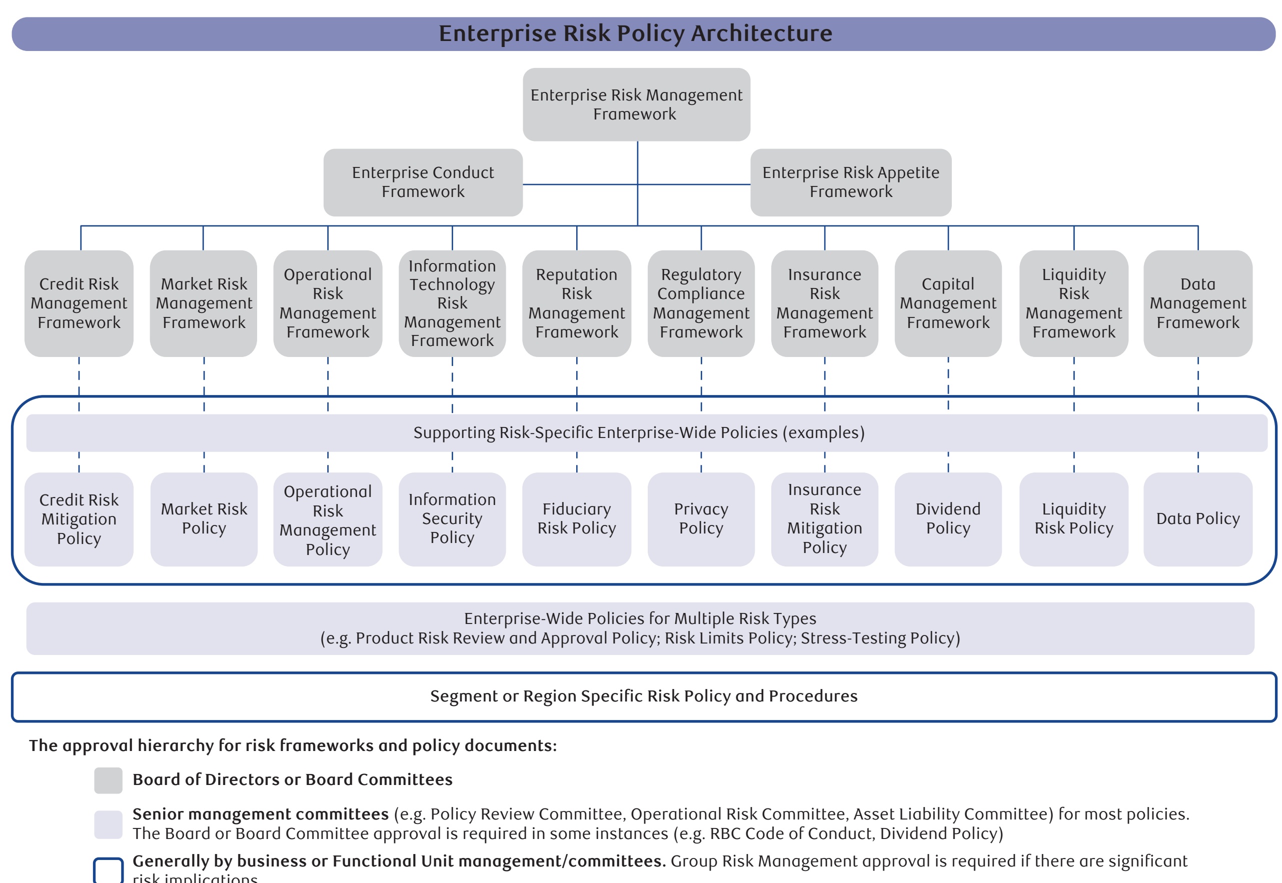
Quantitative models are used for many purposes including, but not limited to, the valuation of financial products, the identification, measurement and management of different types of risk, stress testing, assessing capital adequacy, informing business and risk decisions, measuring compliance with internal 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	Investment Grade
3	0.0301% – 0.0375%	0.0266% – 0.0375%	1M	AA	Aa2	Investment Grade
4	0.0376% – 0.0490%		1L	AA-	Aa3	Investment Grade
5	0.0491% – 0.0650%		2+H	A+	A1	Investment Grade
6	0.0651% – 0.0810%		2+M	A	A2	Investment Grade
7	0.0811% – 0.1120%		2+L	A-	A3	Investment Grade
8	0.1121% – 0.1800%		2H	BBB+	Baa1	Investment Grade
9	0.1801% – 0.2620%		2M	BBB	Baa2	Investment Grade
10	0.2621% – 0.3845%		2L	BBB-	Baa3	Investment Grade
11	0.3846% – 0.6480%		2-H	BB+	Ba1	Non-investment Grade
12	0.6481% – 0.9625%		2-M	BB	Ba2	Non-investment Grade
13	0.9626% – 1.4070%		2-L	BB-	Ba3	Non-investment Grade
14	1.4071% – 2.1785%		3+H	B+	B1	Non-investment Grade
15	2.1786% – 3.4210%		3+M	B	B2	Non-investment Grade
16	3.4211% – 5.2775%		3+L	B-	B3	Non-investment Grade
17	5.2776% – 7.9410%		3H	CCC+	Caa1	Non-investment Grade
18	7.9411% – 11.4475%		3M	CCC	Caa2	Non-investment Grade
19	11.4476% – 19.6535%		3L	CCC-	Caa3	Non-investment Grade
20	19.6536% – 99.9990%		4	CC	Ca	Non-investment Grade
21	100%		5	C	C	Impaired
22	100%		6	D	C	Impaired

* 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											
	October 31 2019						October 31 2018 (1)					
	Credit risk (2)			Counterparty credit risk (3)			Credit risk (2)			Counterparty credit risk (3)		
		Off-balance sheet amount (4)						Off-balance sheet amount (4)				
(Millions of Canadian dollars)	On-balance sheet amount	Undrawn	Other (5)	Repo-style transactions	Derivatives	Total exposure	On-balance sheet amount	Undrawn	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								As at 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

	As at October 31, 2019						
	Residential mortgages						Home equity lines of credit
(Millions of Canadian dollars, except percentage amounts)	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

	As at October 31, 2018						
	Residential mortgages						Home equity lines of credit
(Millions of Canadian dollars, except percentage amounts)	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**

	As at and for the year ended	
(Millions of Canadian dollars, except percentage amounts)	**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	As at 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**

	October 31, 2019				October 31, 2018			
		For the year ended				For the year ended		
(Millions of Canadian dollars)	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

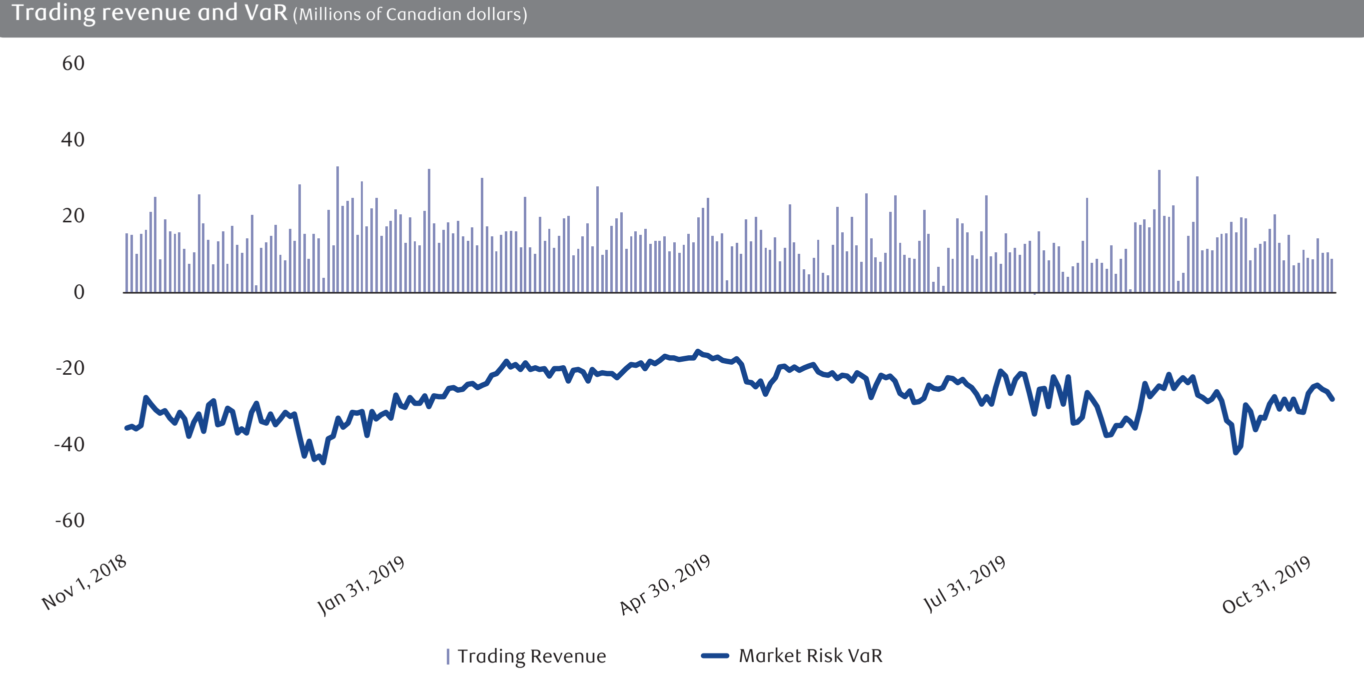
2019 vs. 2018

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.

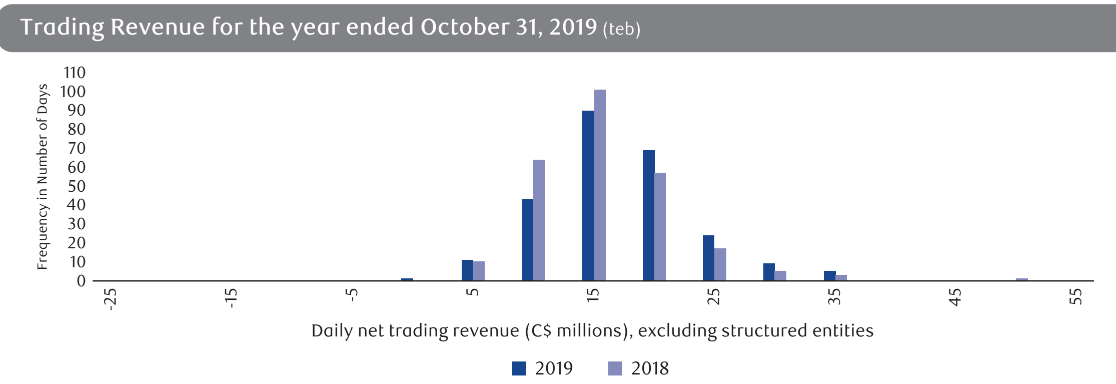
Average SVaR of $106 million increased $27 million from the prior year, largely due to growth in certain fixed income portfolios sustained since the first quarter of fiscal 2019, in addition to the impact from heightened equity market volatility mentioned above.

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						2018	
	EVE risk			NII risk (1)				
	Canadian dollar impact	U.S. dollar impact (2)	Total	Canadian dollar impact	U.S. dollar impact (2)	Total	EVE risk	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**

	As at October 31, 2019			
		Market risk measure		
(Millions of Canadian dollars)	Balance sheet amount	Traded risk (1)	Non-traded risk (2)	Non-traded risk primary risk sensitivity
Assets subject to market risk				
Cash and due from banks	$ 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)	As at October 31, 2018			
		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	$ 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**

	As at	
(Millions of Canadian dollars)	**October 31 2019**	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.

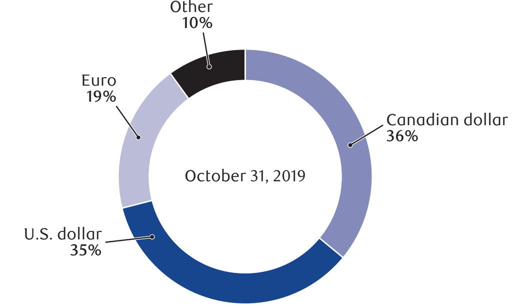
Our wholesale funding activities are well-diversified by geography, investor segment, instrument, currency, structure and maturity. We maintain an ongoing presence in different funding markets which allows us to continuously monitor market developments and trends, identify opportunities and risks, and 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

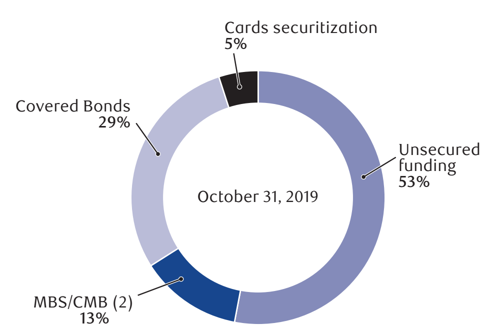
We also raise long-term funding using Canadian Senior Notes, Canadian National Housing Act MBS, Canada Mortgage Bonds, credit card receivable-backed securities, Kangaroo Bonds (issued in the Australian domestic market by foreign firms) and Yankee Certificates of Deposit (issued in the U.S. domestic market 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)	As at October 31, 2019							
	Less than 1 month	1 to 3 months	3 to 6 months	6 to 12 months	Less than 1 year sub-total	1 year to 2 years	2 years and greater	Total
Deposits from banks (2)	$ 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)	As at October 31, 2018							
	Less than 1 month	1 to 3 months	3 to 6 months	6 to 12 months	Less than 1 year sub-total	1 year to 2 years	2 years and greater	Total
Deposits from banks (2)	$ 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.

	As at October 31, 2018									
(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	$ 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:

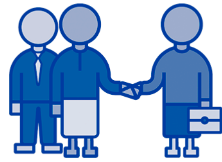
- Risk identification and assessment tools, including the collection and analysis of risk event data, help risk owners understand and proactively manage operational risk exposures. Risk assessments ensure alignment between risk exposures and efforts to manage them. Management uses outputs of these tools 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:

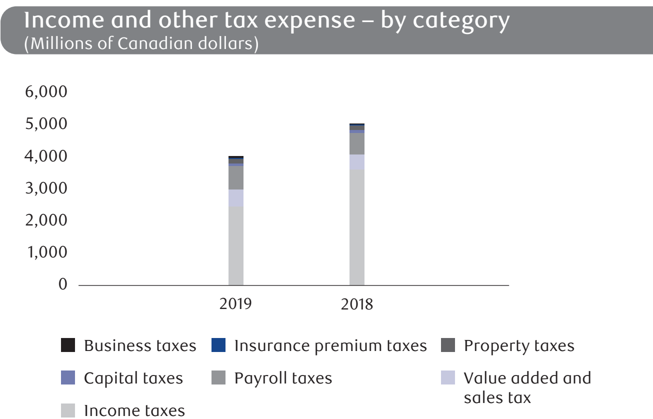
- Act with integrity and in a straightforward, open and honest manner in all tax matters;
- Ensure tax strategy is aligned with our business strategy supporting only bona fide transactions with a business purpose and economic substance;
- Ensure all intercompany transactions are conducted on arm's length 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.

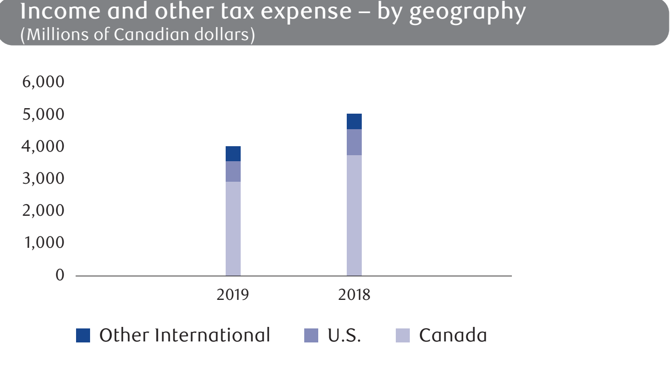
With respect to assessing the needs of our clients, we consider a number of factors including the purpose of the transactions. We seek to ensure that we only support bona fide client transactions with a business purpose and economic substance. Should we become aware of client transactions that are aimed 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).





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

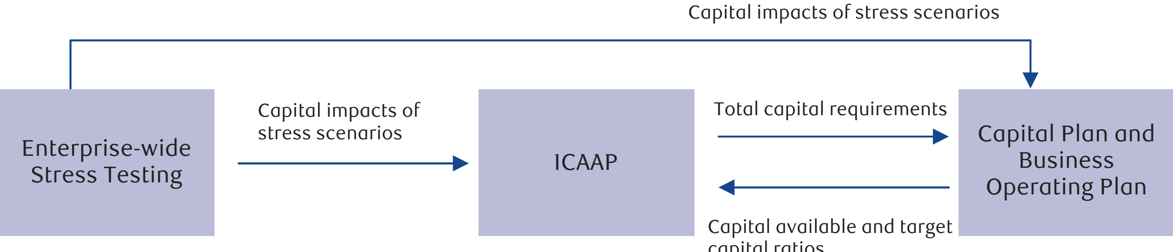
We actively manage our capital to maintain strong capital ratios and high ratings while providing strong returns to our shareholders. In addition to the regulatory requirements, we consider the expectations of credit rating agencies, depositors and shareholders, as well as our business plans, stress 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

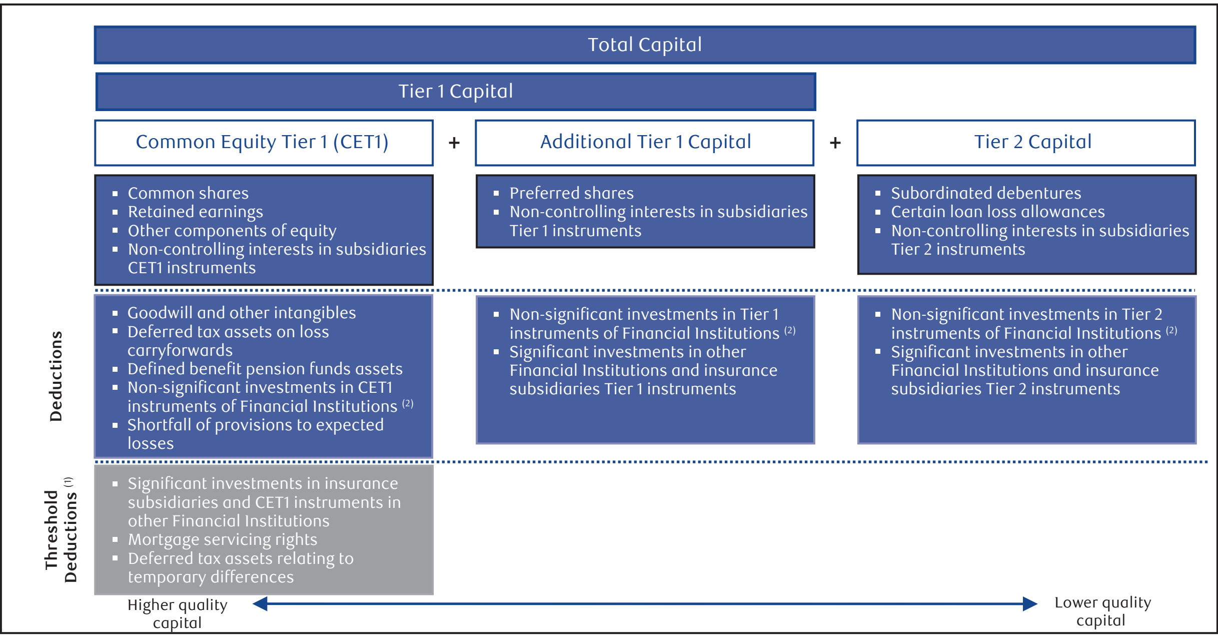
Under Basel III, regulatory capital consists of CET1, Additional Tier 1 and Tier 2 capital.

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

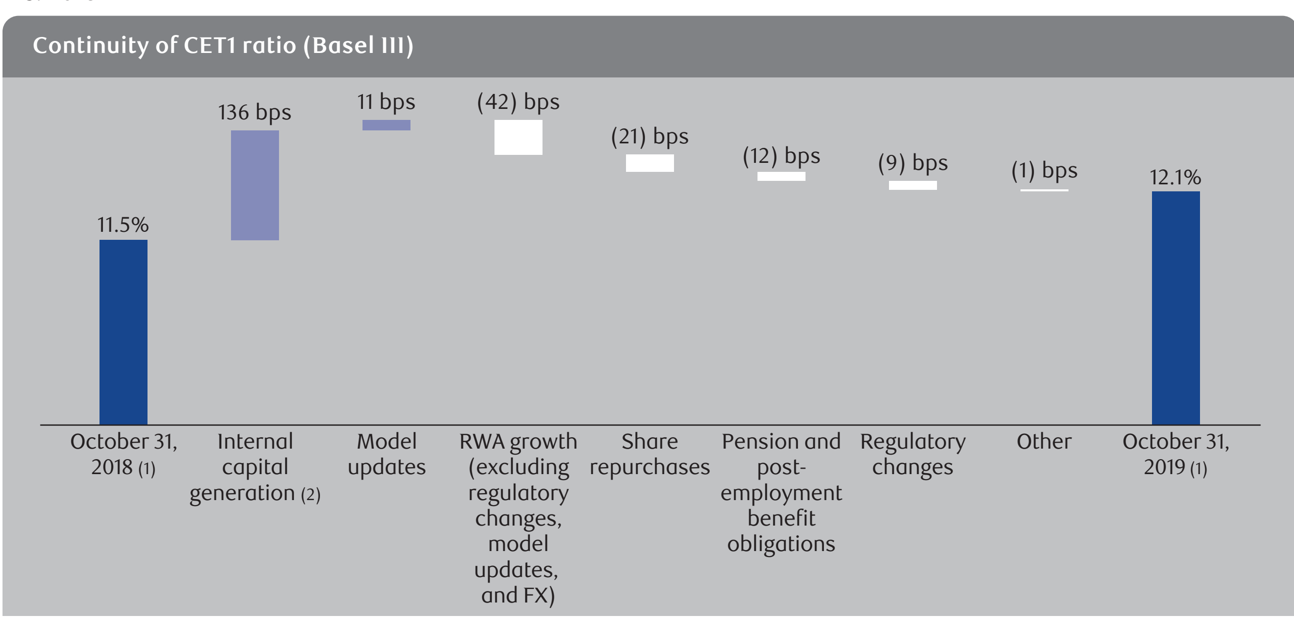
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	As at October 31 2019	October 31 2018
Capital (1)		
CET1 capital	$ 62,184	$ 57,001
Tier 1 capital	67,861	63,279
Total capital	77,888	72,494
Risk-weighted Assets (RWA) used in calculation of capital ratios (1), (2)		
CET1 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**

	2019						2018
			Risk-weighted assets				
As at October 31 (Millions of Canadian dollars, except percentage amounts)	Exposure (1)	Average of risk-weights (2)	Standardized approach	Advanced approach	Other	Total	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.

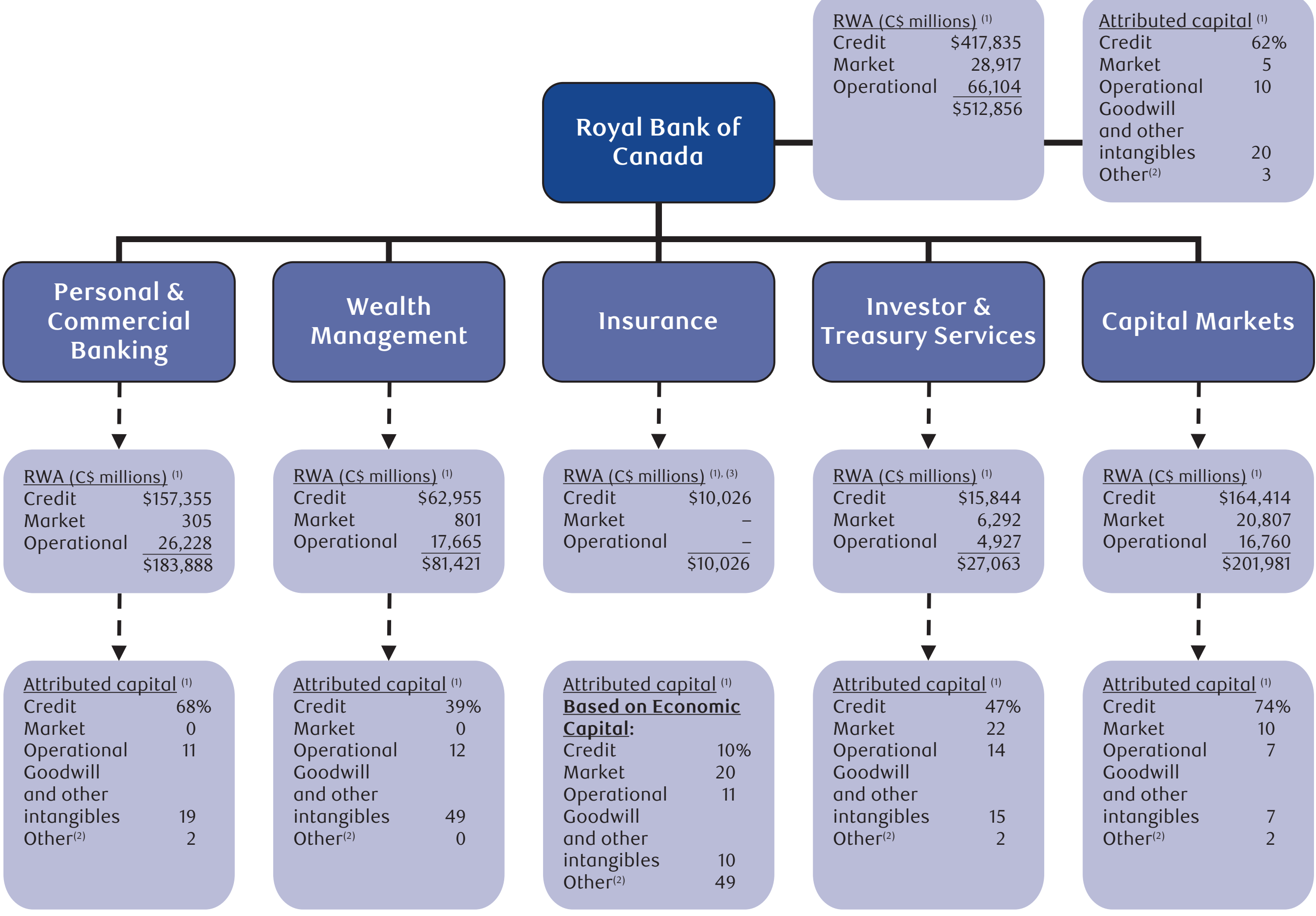
NVCC provisions require the conversion of the capital instrument into a variable number of common shares in the event that OSFI deems a bank to be non-viable or a federal or provincial government in Canada publicly announces that a bank has accepted or agreed to accept a capital injection. If a NVCC 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.

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)	2019 vs. 2018 Average rate (2)	2019 vs. 2018 Net change	2018 vs. 2017 Increase (decrease) due to changes in Average volume (2)	2018 vs. 2017 Average rate (2)	2018 vs. 2017 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:

Type of Risk	Recommendation	Disclosure	Location of disclosure: Annual Report page	Location of disclosure: 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.