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, 2018, compared to the preceding fiscal year. This MD&A should be read in conjunction with our 2018 Annual Consolidated Financial Statements and related notes and is dated November 27, 2018. 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 2018 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 25
- Wealth Management 29
- Insurance 35
- Investor & Treasury Services 38
- Capital Markets 40
- Corporate Support 44

Quarterly financial information 44
- Fourth quarter performance 44
- Quarterly results and trend analysis 45

Financial condition 46
- Condensed balance sheets 46
- Off-balance sheet arrangements 47

Risk management 49
- Overview 49
- Top and emerging risks 50
- Enterprise risk management 52

Transactional/positional risk drivers 56
- Credit risk 56
- Market risk 67
- Liquidity and funding risk 72
- Insurance risk 83

Execution risk drivers 83
- Operational risk 83
- Regulatory compliance risk 85

Strategic risk drivers 85
- Strategic risk 85
- Reputation risk 85
- Legal and regulatory environment risk 86
- Competitive risk 87

Macroeconomic risk drivers 87
- Systemic risk 87

Overview of other risks 88
Capital management 90
Capital, liquidity and other regulatory developments 99
Accounting and control matters 100
- Critical accounting policies and estimates 100
- Controls and procedures 104

Related party transactions 104
Supplementary information 104
Enhanced Disclosure Task Force recommendations index 112

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 2018 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 our Annual Report for the fiscal year ended October 31, 2018 (2018 Annual Report) including global uncertainty, Canadian housing and household indebtedness, information technology and cyber risk, regulatory changes, digital disruption and innovation, data and third party related risks, 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 2018 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 2018 Annual Report.

Overview and outlook

Selected financial and other highlights

Table 1

(Millions of Canadian dollars, except per share, number of and percentage amounts) (1)	2018	2017	2018 vs. 2017 Increase (decrease)	
Total revenue	$ 42,576	$ 40,669	$ 1,907	4.7%
Provision for credit losses (PCL) (2)	1,307	1,150	157	13.7%
Insurance policyholder benefits, claims and acquisition expense (PBCAE)	2,676	3,053	(377)	(12.3)%
Non-interest expense	22,833	21,794	1,039	4.8%
Income before income taxes	15,760	14,672	1,088	7.4%
Net income	$ 12,431	$ 11,469	$ 962	8.4%
Segments – net income				
Personal & Commercial Banking	$ 6,028	$ 5,755	$ 273	4.7%
Wealth Management	2,265	1,838	427	23.2%
Insurance	775	726	49	6.7%
Investor & Treasury Services	741	741	–	0.0%
Capital Markets	2,777	2,525	252	10.0%
Corporate Support	(155)	(116)	(39)	n.m.
Net income	$ 12,431	$ 11,469	$ 962	8.4%
Selected information				
Earnings per share (EPS) – basic	$ 8.39	$ 7.59	$ 0.80	10.5%
– diluted	8.36	7.56	0.80	10.6%
Return on common equity (ROE) (3), (4)	17.6%	17.0%	n.m.	60 bps
Average common equity (3)	$ 68,900	$ 65,300	$ 3,600	5.5%
Net interest margin (NIM) – on average earning assets, net (3)	1.66%	1.72%	n.m.	(6) bps
PCL as a % of average net loans and acceptances (5)	0.23%	0.21%	n.m.	2 bps
PCL on impaired loans as a % of average net loans and acceptances (5)	0.20%	0.21%	n.m.	(1) bps
Gross impaired loans (GIL) as a % of loans and acceptances (6), (7)	0.37%	0.46%	n.m.	(9) bps
Liquidity coverage ratio (LCR) (8)	123%	122%	n.m.	100 bps
Capital ratios and Leverage ratio (9)				
Common Equity Tier 1 (CET1) ratio	11.5%	10.9%	n.m.	60 bps
Tier 1 capital ratio	12.8%	12.3%	n.m.	50 bps
Total capital ratio	14.6%	14.2%	n.m.	40 bps
Leverage ratio	4.4%	4.4%	n.m.	– bps
Selected balance sheet and other information (10)				
Total assets	$ 1,334,734	$ 1,212,853	$ 121,881	10.0%
Securities, net of applicable allowance	222,866	218,379	4,487	2.1%
Loans, net of allowance for loan losses	576,818	542,617	34,201	6.3%
Derivative related assets	94,039	95,023	(984)	(1.0)%
Deposits	837,046	789,635	47,411	6.0%
Common equity	73,552	67,416	6,136	9.1%
Total capital risk-weighted assets	496,459	474,478	21,981	4.6%
Assets under management (AUM)	671,000	639,900	31,100	4.9%
Assets under administration (AUA) (11)	5,533,700	5,473,300	60,400	1.1%
Common share information				
Shares outstanding (000s) – average basic	1,443,894	1,466,988	(23,094)	(1.6)%
– average diluted	1,450,485	1,474,421	(23,936)	(1.6)%
– end of period (12)	1,438,794	1,452,535	(13,741)	(0.9)%
Dividends declared per common share	$ 3.77	$ 3.48	$ 0.29	8.3%
Dividend yield (13)	3.7%	3.8%	n.m.	(10) bps
Common share price (RY on TSX) (14)	$ 95.92	$ 100.87	$ (4.95)	(4.9)%
Market capitalization (TSX) (14)	138,009	146,554	(8,545)	(5.8)%
Business information (number of)				
Employees (full-time equivalent) (FTE)	81,870	78,210	3,660	4.7%
Bank branches	1,333	1,376	(43)	(3.1)%
Automated teller machines (ATMs)	4,537	4,630	(93)	(2.0)%
Period average US$ equivalent of C$1.00 (15)	$ 0.776	$ 0.765	$ 0.011	1.4%
Period-end US$ equivalent of C$1.00	$ 0.760	$ 0.775	$ (0.015)	(1.9)%

(1) Effective November 1, 2017, we adopted IFRS 9 *Financial Instruments* (IFRS 9). Results from periods prior to November 1, 2017 are reported in accordance with IAS 39 *Financial Instruments: Recognition and Measurement* (IAS 39) in this 2018 Annual Report. For further details on the impacts of the adoption of IFRS 9 including the description of accounting policies selected, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

(2) Under IFRS 9, PCL relates primarily to loans, acceptances, and commitments, and also applies to all financial assets except for those classified or designated as fair value through profit or loss (FVTPL) and equity securities designated as fair value through other comprehensive income (FVOCI). Prior to the adoption of IFRS 9, PCL related only to loans, acceptances, and commitments. PCL on loans, acceptances, and commitments is comprised of PCL on impaired loans (Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39) and PCL on performing loans (Stage 1 and Stage 2 PCL under IFRS 9 and PCL on loans not yet identified as impaired under IAS 39). Refer to the Credit risk section and Note 2 of our 2018 Annual Consolidated Financial Statements for further details.

(3) 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.

(4) 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.

(5) PCL represents PCL on loans, acceptances and commitments. PCL on impaired loans represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39. Stage 3 PCL under IFRS 9 is comprised of lifetime credit losses of credit-impaired loans, acceptances and commitments.

(6) Effective November 1, 2017, GIL excludes $229 million of acquired credit-impaired (ACI) loans related to our acquisition of City National Bank (City National) that have returned to performing status. As at October 31, 2018, $21 million of ACI loans that remain impaired are included in GIL. As at October 31, 2017, GIL includes $256 million related to the ACI loans portfolio from our acquisition of City National. ACI loans included in GIL added 5 bps to our 2017 GIL ratio. For further details, refer to Note 5 of our 2018 Annual Consolidated Financial Statements.

(7) 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, resulting in an increase in GIL of $134 million.

(8) LCR is calculated using the Basel III Liquidity Adequacy Requirements (LAR) guideline. For further details, refer to the Liquidity and funding risk section.

(9) Capital and Leverage ratios presented above are on an "all-in" basis. The Leverage ratio is a regulatory measure under the Basel III framework. For further details, refer to the Capital management section.

(10) Represents period-end spot balances.

(11) AUA includes $16.7 billion and $9.6 billion (2017 – $18.4 billion and $8.4 billion) of securitized residential mortgages and credit card loans, respectively.

(12) Common shares outstanding has been adjusted to include the impact of treasury shares.

(13) Defined as dividends per common share divided by the average of the high and low share price in the relevant period.

(14) Based on TSX closing market price at period-end.

(15) 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 84,000+ 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 16 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 strength of our relationships with many of our clients is underscored by the breadth of our products and the depth of expertise within our businesses.
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 life, health, home, auto, travel, wealth, annuities and reinsurance advice and solutions, as well as creditor and business insurance services to individual, business and group clients.
Investor & Treasury Services	Acts as a specialist provider of asset services, and a provider of cash management, transaction banking, and treasury services to institutional clients worldwide. We also provide Canadian dollar cash management, correspondent banking and trade finance for financial institutions globally and short-term funding and liquidity management for the bank.
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. and Europe, and Australia, Asia & other regions.
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, and Functions, which includes our finance, human resources, risk management, internal audit and other functional groups.

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 2018 against our business strategies and strategic goals, refer to the Business segment results section.

Economic, market and regulatory review and outlook – data as at November 27, 2018

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 2.1% in calendar 2018, which is down from 3.0% in the previous calendar year. The unemployment rate for October was 5.8%, down from 6.3% a year ago. Economic growth has shifted away from consumers as they adjust their spending habits in response to higher interest rates and a slower housing market. However, consumption is expected to grow at a moderate pace driven by rising wages and a healthy labour market. The successful conclusion of trade talks between the U.S., Canada, and Mexico (USMCA) has reduced trade uncertainty, which previously had an adverse effect on business sentiment. The USMCA trade deal should encourage firms to invest in order to alleviate capacity pressures and improve productivity. In October, the Bank of Canada (BoC) raised its overnight rate by 25 basis points to 1.75%, the fifth rate hike in 15 months. In calendar 2019, we expect the economy to continue to grow at a slightly more moderate pace.

U.S.

The U.S. economy is expected to grow by 2.9% in calendar 2018, in comparison to 2.2% in the previous calendar year. Consumer spending has been supported by a strong labour market, rising wages, and strong consumer confidence. Business investment has increased amid solid domestic demand and still-accommodative financial conditions, and fiscal stimulus continues to provide support. The impact of higher import tariffs has not influenced growth notably, but rising protectionism still remains a downside risk to the outlook. In November, the Federal Reserve (Fed) held the federal funds range at 2.0% to 2.25% as its outlook remained "balanced". With fiscal spending expecting to continue in calendar 2019 and low unemployment, we anticipate growth to moderate in calendar 2019, but remain at an above-trend pace.

Europe
The economy in the Eurozone is expected to grow at a rate of 1.9% in calendar 2018, which is lower than the prior calendar year of 2.5%. Trade has been impacted by weaker exports to emerging markets, however, domestic demand has supported growth as unemployment and interest rates remain low. There is still a high level of uncertainty over the future U.K.-European Union (EU) trading relationship as the March 2019 Brexit deadline draws near. As economic indicators point to a gradual increase in inflation, the European Central Bank (ECB) has announced intentions to end net asset purchases in December. In calendar 2019, we expect growth to soften slightly as some economies reach capacity limits and financial conditions begin to tighten somewhat.

Financial markets
Global equity markets have experienced elevated volatility in the fiscal year. A number of indices posted record highs in mid-January, as markets rallied on optimistic growth outlooks. Rising interest rates, inflationary concerns, recent declines in commodity prices, and global trade tensions, including potential trade disputes with the U.S., have triggered equity markets to fall from their recent highs. October saw notable corrections as the S&P 500 declined by nearly 7%, its worst monthly performance in seven years, and the MSCI World index saw declines of 7.4%. As the Fed continues to raise short-term interest rates, the U.S. yield curve has flattened. As the global economy continues to expand, we expect central banks in Canada, the U.S. and the Eurozone to continue to raise interest rates in 2019.

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, the transition from the London Interbank Offered Rate (LIBOR) to alternative "risk-free" rates, and the U.S., the U.K. and European regulatory reform.

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 progress against our medium-term TSR objectives. 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 2018 performance against our medium-term financial performance objectives:

2018 Financial performance compared to our medium-term objectives — Table 2

	2018 results
Diluted EPS growth of 7% +	10.6%
ROE of 16% +	17.6%
Strong capital ratios (CET1) (1)	11.5%
Dividend payout ratio 40% – 50%	45%

(1) For further details on the CET1 ratio, refer to the Capital management section.

For 2019, 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 – three and five year TSR vs. peer group average — Table 3

	Three year TSR (1)	Five year TSR (1)
Royal Bank of Canada	13% Top half	11% Top half
Peer group average (excluding RBC)	9%	8%

(1) The three and the five 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, 2015 to October 31, 2018 and October 31, 2013 to October 31, 2018, respectively.

Common share and dividend information — Table 4

For the year ended October 31	2018	2017	2016	2015	2014
Common share price (RY on TSX) – close, end of period	$ 95.92	$ 100.87	$ 83.80	$ 74.77	$ 80.01
Dividends paid per share	3.70	3.40	3.20	3.04	2.76
Increase (decrease) in share price	(4.9)%	20.4%	12.1%	(6.5)%	14.3%
Total shareholder return	(1.0)%	25.0%	16.8%	(3.0)%	19.0%

Financial performance

Overview

2018 vs. 2017

Net income of $12,431 million was up $962 million or 8% from a year ago. Diluted earnings per share (EPS) of $8.36 was up $0.80 or 11% and return on common equity (ROE) of 17.6% was up 60 bps from 17.0% last year. Our Common Equity Tier 1 (CET1) ratio was 11.5%, up 60 bps from a year ago.

Our results reflected strong earnings growth in Wealth Management, Personal & Commercial Banking, and Capital Markets. Higher results in Insurance also contributed to the increase, and Investor & Treasury Services earnings remained consistent with the prior year.

Wealth Management earnings increased mainly due to growth in average fee-based client assets, higher net interest income, and a lower effective tax rate reflecting benefits from the U.S. Tax Reform. These factors were partially offset by higher variable compensation on improved results, increased costs related to business growth and technology initiatives, and higher regulatory costs.

Personal & Commercial Banking results were higher mainly reflecting higher spreads, volume growth, and higher card service revenue. These factors were partially offset by our share of the gain related to the sale of the U.S. operations of Moneris Solutions Corporation (Moneris) in the prior year, higher PCL in Canadian Banking, mainly due to the adoption of IFRS 9, and higher staff-related costs.

Capital Markets results were up largely driven by a lower effective tax rate reflecting changes in earnings mix and benefits from the U.S. Tax Reform, and higher revenue in Corporate and Investment Banking and Global Markets. These factors were partially offset by higher regulatory costs, litigation recoveries in the prior year, and higher costs in support of business growth.

Insurance results increased largely driven by higher favourable investment-related experience and life retrocession contract renegotiations. These factors were partially offset by lower favourable annual actuarial assumption updates, higher claims volumes, and increased costs in support of sales growth and client service activities.

Investor & Treasury Services results remained unchanged as improved margins and growth in client deposits and higher revenue in our asset services business was offset by lower funding and liquidity revenue, increased costs in support of business growth, and higher technology investments.

Corporate Support 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. Net loss was $116 million in the prior year, largely reflecting severance and related charges, net unfavourable tax adjustments, and legal costs, 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)	2018 vs. 2017 (1)
Increase (decrease):	
Total revenue	$ (53)
PCL	6
PBCAE	–
Non-interest expense	(29)
Income taxes	(15)
Net income	(15)
Impact on EPS	
Basic	$ (0.01)
Diluted	(0.01)

(1) Effective November 1, 2017, we adopted IFRS 9 *Financial Instruments*. Results from periods prior to November 1, 2017 are reported in accordance with IAS 39 *Financial Instruments: Recognition and Measurement*. For further details on the impacts of the adoption of IFRS 9 including the description of accounting policies selected, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

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)	2018	2017
U.S. dollar	0.776	0.765
British pound	0.578	0.596
Euro	0.654	0.686

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

Total revenue

Table 7

(Millions of Canadian dollars)	2018	2017
Interest income	$ 33,021	$ 26,904
Interest expense	14,830	9,764
Net interest income	$ 18,191	$ 17,140
NIM	1.66%	1.72%
Insurance premiums, investment and fee income	$ 4,279	$ 4,566
Trading revenue	911	806
Investment management and custodial fees	5,377	4,803
Mutual fund revenue	3,551	3,339
Securities brokerage commissions	1,372	1,416
Service charges	1,800	1,770
Underwriting and other advisory fees	2,053	2,093
Foreign exchange revenue, other than trading	1,098	974
Card service revenue	1,054	933
Credit fees	1,394	1,433
Net gains on investment securities (1)	147	172
Share of profit (loss) in joint ventures and associates	21	335
Other	1,328	889
Non-interest income	$ 24,385	$ 23,529
Total revenue	$ 42,576	$ 40,669

(1) Under IFRS 9, the Net gains on investment securities represents realized gains (losses) on debt securities at FVOCI and debt securities at amortized cost. Under IAS 39, the Net gains on investment securities represents realized gains (losses) on debt and equity available-for-sale securities (AFS).

2018 vs. 2017

Total revenue increased $1,907 million or 5%, largely due to increased net interest income. Higher investment management and custodial fees, other revenue, and mutual fund revenue also contributed to the increase. These factors were partially offset by a lower share of profit in joint ventures and associates and lower insurance premiums, investment and fee income (insurance revenue).

Net interest income increased $1,051 million or 6%, largely due to the impact of higher interest rates and volume growth in Canadian Banking and Wealth Management. These factors were partially offset by lower funding and liquidity revenue.

NIM was down 6 bps compared to last year mainly due to a shift in the average earning asset mix with volume growth primarily in low margin reverse repos. These factors were partially offset by improved spreads on deposits in Canadian Banking and on loans in Wealth Management, reflecting the rising interest rate environment.

Investment management and custodial fees increased $574 million or 12%, mainly due to higher average fee-based assets reflecting net sales and market appreciation.

Other revenue increased $439 million or 49%, primarily due to higher gains on non-trading derivatives in our funding and liquidity business, which are largely offset in net interest income, and net gains in our non-trading investment portfolios.

Mutual fund revenue increased $212 million or 6%, mainly reflecting higher average fee-based assets reflecting net sales and market appreciation, and higher balances driving higher mutual fund distribution fees in Canadian Banking.

Share of profit in joint ventures and associates decreased $314 million or 94%, primarily due to our share of the gain related to the sale of the U.S. operations of Moneris in the prior year and a loss on an investment in an international asset management joint venture.

Insurance revenue decreased $287 million or 6%, mainly reflecting the change in fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE. This was partially offset by business growth, and the impact of restructured international life contracts, which is largely offset in PBCAE.

Additional trading information

Table 8

(Millions of Canadian dollars)	2018	2017
Total trading revenue		
Net interest income	$ 2,199	$ 2,370
Non-interest income	911	806
Total trading revenue	$ 3,110	$ 3,176
Total trading revenue by product		
Interest rate and credit	$ 1,573	$ 1,796
Equities	1,014	895
Foreign exchange and commodities	523	485
Total trading revenue	$ 3,110	$ 3,176
Trading revenue (teb) by product		
Interest rate and credit	$ 1,573	$ 1,796
Equities	1,332	1,221
Foreign exchange and commodities	523	485
Total trading revenue (teb)	$ 3,428	$ 3,502
Trading revenue (teb) by product – Capital Markets		
Interest rate and credit	$ 1,303	$ 1,466
Equities	1,415	1,251
Foreign exchange and commodities	377	331
Total Capital Markets trading revenue (teb)	$ 3,095	$ 3,048

2018 vs. 2017

Total trading revenue of $3,110 million, which is comprised of trading-related revenue recorded in Net interest income and Non-interest income, was down $66 million, or 2%, mainly due to lower fixed income trading revenue primarily in the U.S. and Europe, largely offset by higher equity trading revenue primarily in North America.

Provision for credit losses

2018 vs. 2017

Total PCL increased $157 million from the prior year.

PCL on loans increased $133 million, or 12% from the prior year, mainly due to the adoption of IFRS 9 on November 1, 2017 as well as higher provisions in Personal & Commercial Banking. PCL ratio on loans increased 2 bps.

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

Insurance policyholder benefits, claims and acquisition expense (PBCAE)

2018 vs. 2017

PBCAE of $2,676 million decreased $377 million or 12% from the prior year, mainly due to the change in fair value of investments backing our policyholder liabilities, which is largely offset in revenue, higher favourable investment-related experience, and life retrocession contract renegotiations. These factors were partially offset by lower favourable annual actuarial assumption updates, largely related to economic, mortality and longevity experience. Restructured international life contracts, which is largely offset in revenue, higher claims volumes in both Canadian and International Insurance, and business growth also partially offset the decrease in PBCAE.

Non-interest expense

Table 9

(Millions of Canadian dollars, except percentage amounts)	2018	2017
Salaries	$ 6,077	$ 5,936
Variable compensation	5,597	5,203
Benefits and retention compensation	1,779	1,792
Share-based compensation	323	399
Human resources	$ 13,776	$ 13,330
Equipment	1,593	1,434
Occupancy	1,558	1,588
Communications	1,049	1,011
Professional fees	1,379	1,214
Amortization of other intangibles	1,077	1,015
Other	2,401	2,202
Non-interest expense	$ 22,833	$ 21,794
Efficiency ratio (1)	53.6%	53.6%
Efficiency ratio adjusted (2)	53.1%	53.5%

(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.

2018 vs. 2017
Non-interest expense increased $1,039 million or 5%, mainly due to increased costs in support of business growth and an increase in technology and related costs, including digital initiatives, as well as higher staff-related costs, including variable compensation on improved results. Higher regulatory and marketing costs, and litigation recoveries in the prior year also contributed to the increase.

Our efficiency ratio of 53.6% was flat from last year. Excluding the change in fair value of investments backing our policyholder liabilities, our efficiency ratio of 53.1% decreased 40 bps from last year mainly driven by higher revenue across most business segments, partially offset by generally higher expenses as noted by the drivers above.

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)	2018	2017
Income taxes	$ 3,329	$ 3,203
Other taxes		
Goods and services sales taxes	$ 468	$ 446
Payroll taxes	687	643
Capital taxes	80	88
Property taxes	132	140
Insurance premium taxes	29	30
Business taxes	37	46
	$ 1,433	$ 1,393
Total income and other taxes	$ 4,762	$ 4,596
Income before income taxes	$ 15,760	$ 14,672
Canadian statutory income tax rate (1)	26.5%	26.5%
Lower average tax rate applicable to subsidiaries (2)	(4.8)%	(3.5)%
Tax-exempt income from securities	(1.8)%	(2.0)%
Tax rate change	0.9%	(0.1)%
Other	0.3%	0.9%
Effective income tax rate	21.1%	21.8%
Effective total tax rate (3)	27.7%	28.6%

(1) Blended Federal and Provincial statutory income tax rate.
(2) As the reduced tax rates from the U.S. Tax Reform were effective on January 1, 2018, the Lower average tax rate applicable to subsidiaries includes the fiscal 2018 blended rate for U.S. subsidiaries.
(3) Total income and other taxes as a percentage of income before income taxes and other taxes.

2018 vs. 2017
Income tax expense increased $126 million or 4% from last year, mainly due to higher earnings before income tax. The writedown of net deferred tax assets from the impact of the U.S. Tax Reform was more than offset by the lower corporate tax rate on U.S. earnings.

The effective tax rate of 21.1% decreased 70 bps, mainly due to higher net favourable tax adjustments, higher income from lower tax rate jurisdictions, and the net impact of the U.S. Tax Reform, as the writedown of net deferred tax assets was more than offset by the lower corporate tax rate on U.S. earnings. These factors were partially offset by the impact of our share of the gain related to the sale of our U.S. operations of Moneris in the prior year.

Other taxes increased $40 million or 3% from 2017, mainly due to 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 77% of total AUA, as at October 31, 2018, followed by our Wealth Management and Personal & Commercial Banking businesses with approximately 18% and 5% of total AUA, respectively.

2018 vs. 2017
AUA increased $60 billion or 1% compared to last year, mainly reflecting net sales and the impact of foreign exchange translation.

The following table summarizes AUA by geography and asset class:

AUA by geographic mix and asset class — Table 11

(Millions of Canadian dollars)	2018	2017
Canada (1)		
Money market	$ 31,800	$ 33,100
Fixed income	706,800	730,100
Equity	635,700	765,800
Multi-asset and other	934,500	774,900
Total Canada	$ 2,308,800	$ 2,303,900
U.S. (1)		
Money market	$ 33,000	$ 35,400
Fixed income	133,900	124,500
Equity	264,800	238,100
Multi-asset and other	64,800	57,500
Total U.S.	$ 496,500	$ 455,500
Other International (1)		
Money market	$ 43,900	$ 43,300
Fixed income	356,000	387,500
Equity	871,700	867,600
Multi-asset and other	1,456,800	1,415,500
Total International	$ 2,728,400	$ 2,713,900
Total AUA	$ 5,533,700	$ 5,473,300

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

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 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.

2018 vs. 2017

AUM increased $31 billion or 5% compared to last year, primarily due to net sales.

The following table presents the change in AUM for the year ended October 31, 2018:

Client assets – AUM — Table 12

	2018					2017
(Millions of Canadian dollars)	Money market	Fixed income	Equity	Multi-asset and other	Total	Total
AUM, beginning balance	$ 36,900	$ 200,900	$ 128,700	$ 273,400	$ 639,900	$ 586,300
Institutional inflows	52,100	38,400	6,600	7,500	104,600	69,300
Institutional outflows	(52,800)	(34,700)	(7,600)	(3,500)	(98,600)	(77,800)
Personal flows, net	3,100	1,700	7,100	18,500	30,400	31,600
Total net flows	2,400	5,400	6,100	22,500	36,400	23,100
Market impact	300	(3,100)	(2,100)	(4,300)	(9,200)	42,400
Acquisition/dispositions	–	–	–	–	–	(4,000)
Foreign exchange	600	600	1,300	1,400	3,900	(7,900)
Total market, acquisition/dispositions and foreign exchange impact	900	(2,500)	(800)	(2,900)	(5,300)	30,500
AUM, balance at end of year	$ 40,200	$ 203,800	$ 134,000	$ 293,000	$ 671,000	$ 639,900

Business segment results

Results by business segments

Table 13

(Millions of Canadian dollars, except percentage amounts) (1)	2018							2017
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (2)	Corporate Support (2)	Total	Total
Net interest income	$ 11,776	$ 2,602	$ –	$ 297	$ 3,567	$ (51)	$ 18,191	$ 17,140
Non-interest income	5,140	8,324	4,279	2,294	4,831	(483)	24,385	23,529
Total revenue	$ 16,916	$ 10,926	$ 4,279	$ 2,591	$ 8,398	$ (534)	$ 42,576	$ 40,669
PCL (3)	1,273	(15)	–	1	48	–	1,307	1,150
PBCAE	–	–	2,676	–	–	–	2,676	3,053
Non-interest expense	7,526	8,070	602	1,617	4,960	58	22,833	21,794
Net income before income taxes	$ 8,117	$ 2,871	$ 1,001	$ 973	$ 3,390	$ (592)	$ 15,760	$ 14,672
Income tax	2,089	606	226	232	613	(437)	3,329	3,203
Net income	$ 6,028	$ 2,265	$ 775	$ 741	$ 2,777	$ (155)	$ 12,431	$ 11,469
ROE (4)	27.6%	16.3%	39.3%	23.5%	13.0%	n.m.	17.6%	17.0%
Average assets	$ 442,500	$ 89,600	$ 15,800	$ 132,100	$ 576,300	$ 38,600	$1,294,900	$1,186,600

(1) Effective November 1, 2017, we adopted IFRS 9 *Financial Instruments* (IFRS 9). Results from periods prior to November 1, 2017 are reported in accordance with IAS 39 *Financial Instruments: Recognition and Measurement* (IAS 39) in this 2018 Annual Report. For further details on the impacts of the adoption of IFRS 9 including the description of accounting policies selected, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

(2) Net interest income, Non-interest income, Total revenue, Net income before income taxes, and Income tax are presented in Capital Markets on a taxable equivalent basis (teb). The teb adjustment is eliminated in the Corporate Support segment. For a further discussion, refer to the How we measure and report our business segments section.

(3) Under IFRS 9, PCL relates primarily to loans, acceptances, and commitments, and also applies to all financial assets except for those classified or designated as fair value through profit or loss (FVTPL) and equity securities designated as fair value through other comprehensive income (FVOCI). Prior to the adoption of IFRS 9, PCL related only to loans, acceptances, and commitments. PCL on loans, acceptances, and commitments is comprised of PCL on impaired loans (Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39) and PCL on performing loans (Stage 1 and Stage 2 PCL under IFRS 9 and PCL on loans not yet identified as impaired under IAS 39). Refer to the Credit risk section and Note 2 of our 2018 Annual Consolidated Financial Statements for further details.

(4) 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. In 2017, we maintained some of our severance and related costs in Corporate Support.

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

On November 1, 2017, we adopted IFRS 9, which introduced an expected credit loss impairment model that differs from the incurred loss model under IAS 39. 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, refer to Note 2 of our 2018 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. Prior to the adoption of IFRS 9, PCL on loans not yet identified as impaired was included in Corporate Support.

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 taxable equivalent basis (teb), 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**

	2018							2017
(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	$ 5,931	$ 2,209	$ 767	$ 728	$ 2,692	$ (212)	$ 12,115	$ 11,128
Total average common equity (1), (2)	21,500	13,500	1,950	3,100	20,700	8,150	68,900	65,300
ROE (3)	27.6%	16.3%	39.3%	23.5%	13.0%	n.m.	17.6%	17.0%

(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, 2018 with results from last year as well as, in the case of economic profit, measure relative contribution to shareholder value. 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.

Economic profit

Economic profit is net income excluding the after-tax effect of amortization of other intangibles less a capital charge for use of attributed capital. It measures the return generated by our businesses in excess of our cost of shareholders' equity, thus enabling users to identify relative contributions to shareholder value.

The capital charge includes a charge for common equity and preferred shares. For 2018, our cost of common equity remains unchanged at 8.5%.

The following table provides a summary of our Economic profit:

Economic Profit **Table 15**

(Millions of Canadian dollars)	2018 Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	Total
Net income	$ 6,028	$ 2,265	$ 775	$ 741	$ 2,777	$ (155)	$ 12,431
add: Non-controlling interests	(8)	–	–	(1)	–	(22)	(31)
After-tax effect of amortization of other intangibles	12	193	–	14	–	–	219
Adjusted net income (loss)	$ 6,032	$ 2,458	$ 775	$ 754	$ 2,777	$ (177)	$ 12,619
less: Capital charge	1,918	1,205	174	276	1,845	726	6,144
Economic profit (loss)	$ 4,114	$ 1,253	$ 601	$ 478	$ 932	$ (903)	$ 6,475

(Millions of Canadian dollars)	2017 Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	Total
Net income	$ 5,755	$ 1,838	$ 726	$ 741	$ 2,525	$ (116)	$ 11,469
add: Non-controlling interests	(5)	–	–	(1)	–	(35)	(41)
After-tax effect of amortization of other intangibles	11	179	–	15	–	1	206
Adjusted net income (loss)	$ 5,761	$ 2,017	$ 726	$ 755	$ 2,525	$ (150)	$ 11,634
less: Capital charge	1,791	1,206	154	286	1,690	722	5,849
Economic profit (loss)	$ 3,970	$ 811	$ 572	$ 469	$ 835	$ (872)	$ 5,785

Results excluding specified item

There were no specified items for the year ended 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 business segment results and measures excluding the specified item:

Personal & Commercial Banking **Table 16**

(Millions of Canadian dollars, except percentage amounts)	2017 As reported	Item excluded: 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 17

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

(1) Includes foreign currency translation.

Efficiency ratio excluding the change in fair value of investments in Insurance

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

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

Consolidated non-GAAP efficiency ratio — Table 18

(Millions of Canadian dollars, except percentage amounts)	2018			2017		
		Item excluded			Item excluded	
	As reported	Change in fair value of investments backing policyholder liabilities	Adjusted	As reported	Change in fair value of investments backing policyholder liabilities	Adjusted
Total revenue	$ 42,576	$ 435	$ 43,011	$ 40,669	$ 58	$ 40,727
Non-interest expense	22,833	–	22,833	21,794	–	21,794
Efficiency ratio	53.6%		53.1%	53.6%		53.5%

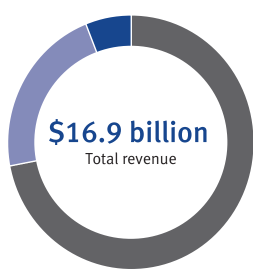
Personal & Commercial Banking

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

› 13 million
Number of clients

› 6 million
Active digital users in Canada

35,573
Employees



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 customers, as well as public institutions. In the U.S., we compete primarily with other Canadian banking institutions with U.S. operations.

2018 Operating environment

- Solid economic growth and low unemployment resulted in continued consumer confidence in Canada, driving solid volume growth.
- The Bank of Canada continued to raise interest rates as the economy returns to full capacity, benefitting our net interest margins.
- The housing market has faced headwinds amid regulatory changes and rising interest rates, contributing to softening mortgage volume growth.
- Growth in our investment product balances was driven by equity market returns and higher investment activity for the majority of the year, partly offset by unfavourable market conditions in the last quarter.
- Credit conditions continued to improve, due to wage growth and lower national unemployment.
- 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 underlying economic challenges in certain regions, which has negatively impacted growth in our loan balances.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2018	PRIORITIES IN 2019
Transform how we serve our clients	Continued to provide exceptional and secure client experiences via our digital platforms while continuing to release significant additional functionality in our RBC Mobile app Continued to innovate our branch network, including introduction and expansion of new formats for students and newcomers	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 segments such as retirees, youth, newcomers and business owners	Focus on engaging key high growth client segments to build new and deeper relationships and achieve industry-leading volume growth
Rapidly deliver digital solutions to our clients	Introduced the ability to open chequing and savings accounts, as well as credit cards, via the RBC Mobile app, in addition to enhancements to credit card controls Launched InvestEase client pilot, a low-cost automated investment advice and portfolio management business Enhanced NOMI Insights™ and NOMI Find & Save™, improving the user experience and providing deeper personalized digital financial insights and a fully automated savings service Continued to roll out MyAdvisor®, an online advice platform to remotely connect a client to an advisor	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 make strategic investments to simplify, digitize and automate activities and processes for both clients and employees	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 invest in our digital banking platforms while streamlining our branch network	Transform our business by investing in our distribution network, supported by digital innovations, self-serve channels, redesigned branches and a proactive mobile sales force, to grow and retain our target retail, business and corporate client base
In the U.S.	Continued strong growth in U.S. cross-border client activity supported by significant enhancements to digital banking capabilities, driving increased client engagement	Continue to fully digitize account opening processes, deliver on targeted marketing, content and service partnerships, and further enhance the digital banking experience to drive client acquisition and volume growth

Outlook

Canada's economy is expected to grow by 2.1% in calendar 2018, with a slightly more moderate pace in calendar 2019. Trends that emerged in 2018, including stronger business investments and exports, offset by moderating consumer spending and housing growth, are expected to persist into calendar 2019. The Bank of Canada has raised their overnight rate by a cumulative 125 basis points since July 2017 and we expect further increases over the next calendar year, which will have a favourable impact on net interest margins, offset by competitive pricing pressures. As a result of regulatory measures implemented by the Federal government in January 2018, we saw a slowdown in the housing market over the first half of calendar 2018 with a slight rebound in the latter half. We expect only modest increases in home sales going forward as rising interest rates and a lack of affordability in key markets will continue to act as headwinds to mortgage volume growth. We 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 will continue to focus on transforming our business in order to be the best bank for our target retail, business and corporate clients, by building an organization with a multi-channel distribution network supported by digital innovations.

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 19
(Millions of Canadian dollars, except number of, percentage amounts and as otherwise noted)	2018	2017
Net interest income	$ 11,776	$ 10,787
Non-interest income	5,140	5,076
Total revenue	16,916	15,863
PCL on performing assets (1)	115	
PCL on impaired assets (2)	1,158	1,054
Total PCL	1,273	1,054
Non-interest expense	7,526	7,176
Income before income taxes	8,117	7,633
Net income	$ 6,028	$ 5,755
Revenue by business		
Canadian Banking	$ 15,970	$ 14,877
Personal Banking	12,237	11,520
Business Banking	3,733	3,357
Caribbean & U.S. Banking	946	986
Key ratios		
ROE	27.6%	28.3%
NIM	2.78%	2.68%
Efficiency ratio	44.5%	45.2%
Operating leverage	1.7%	2.2%
Operating leverage adjusted (3)	3.2%	0.8%
Selected balance sheet information		
Average total assets	$ 442,500	$ 421,100
Average earning assets, net	423,100	403,100
Average loans and acceptances, net	423,700	402,500
Average deposits	361,700	344,400
Other information		
AUA (4), (5)	$ 266,500	$ 264,800
Average AUA	271,800	252,300
AUM (5)	4,700	4,600
Number of employees (FTE) (6)	35,573	34,601
Effective income tax rate	25.7%	24.6%
Credit information		
Gross impaired loans as a % of related loans and acceptances (7)	0.37%	0.36%
PCL on impaired loans as a % of average net loans and acceptances (2)	0.26%	0.26%
Other selected information – Canadian Banking		
Net income	$ 5,860	$ 5,571
NIM	2.73%	2.62%
Efficiency ratio	42.5%	43.2%
Operating leverage	1.5%	2.4%
Operating leverage adjusted (8)	3.1%	0.9%
Effective income tax rate	26.0%	25.1%

(1) PCL on performing assets represents Stage 1 and 2 PCL on all performing assets under IFRS 9, except those classified or designated as FVTPL and equity securities designated as FVOCI. Prior to the adoption of IFRS 9, PCL on performing assets represents PCL for loans not yet identified as impaired and was included in Corporate Support.
(2) PCL on impaired assets includes PCL on credit-impaired loans, acceptances, and commitments (PCL on impaired loans) and PCL on other credit-impaired financial assets. PCL on impaired assets represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39. Stage 3 PCL under IFRS 9 is comprised of lifetime credit losses of all credit-impaired financial assets, except those classified or designated as FVTPL and equity securities designated as FVOCI.
(3) These are non-GAAP measures. Measures 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.
(4) AUA includes securitized residential mortgages and credit card loans as at October 31, 2018 of $16.7 billion and $9.6 billion, respectively (October 31, 2017 – $18.4 billion and $8.4 billion).
(5) Represents year-end spot balances.
(6) Amounts have been revised from those previously presented.
(7) 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.
(8) 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%.

Financial performance

2018 vs. 2017

Net income increased $273 million or 5% from last year as the prior year included our share of the gain related to the sale of the U.S. operations of Moneris of $212 million (before- and after-tax). Excluding our share of the gain, net income increased $485 million or 9%, mainly due to higher spreads, volume growth, and higher card service revenue. These factors were partially offset by higher PCL in Canadian Banking, mainly due to the introduction of PCL on performing financial assets as a result of adopting IFRS 9, and higher staff-related costs.

Total revenue increased $1,053 million or 7%. Excluding our share of the gain related to the sale of Moneris, revenue increased $1,265 million or 8%, reflecting improved spreads and volume growth of 5% in both loans and deposits in Canadian Banking. Higher purchase volumes driving higher card service revenue and higher average balances driving higher mutual fund distribution fees also contributed to the increase.

Net interest margin increased 10 bps, mainly due to improved spreads on deposits in Canadian Banking, reflecting the rising interest rate environment, partially offset by the impact of competitive pricing pressures.

PCL on impaired loans ratio remained flat, reflecting overall stable credit quality trends. PCL on impaired assets increased $104 million, which includes the restructuring of portfolios in Barbados. For further details on performing and impaired PCL, refer to Credit quality performance in the Credit risk section.

Non-interest expense increased $350 million or 5%, primarily attributable to higher staff-related costs in Canadian Banking and an increase in technology and related costs, including digital initiatives. Higher marketing costs also contributed to the increase.

Average loans and acceptances increased $21 billion or 5%, largely due to growth in residential mortgages and business loans.

Average deposits increased $17 billion or 5%, reflecting growth in business and personal deposits.

Results excluding the specified item noted above are non-GAAP measures. For further details, including a reconciliation, refer to the Key performance and non-GAAP measures section.

Business line review

Effective November 1, 2017, the lines of business within Canadian Banking have been realigned in a manner that emphasizes our client-centric strategy. Personal Financial Services and Cards and Payment Solutions, previously reported separately, are reported collectively as Personal Banking, and Business Financial Services has been renamed to Business Banking. The change had no impact on prior period net income for our Personal & Commercial Banking segment.

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 1,203 branches and 4,194 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 $717 million or 6% compared to last year. Excluding our share of the gain noted previously, revenue increased $929 million or 8%, largely reflecting improved spreads and volume growth in residential mortgages and deposits. Higher purchase volumes driving higher card service revenue and higher average balances driving higher mutual fund distribution fees also contributed to the increase.

Average residential mortgages increased 6% compared to last year, mainly due to solid, but moderating, housing activity.

Average deposits increased 4% from last year, largely reflecting acquisitions of new clients and an increase in activity from existing clients. Market appreciation and net sales resulted in continued growth in average mutual fund balances.

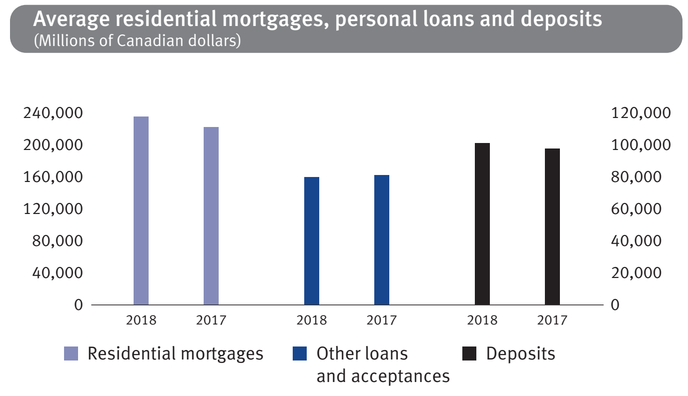
Results excluding the specified item noted above are non-GAAP measures. For further details, including a reconciliation, refer to the Key performance and non-GAAP measures section.

Selected highlights — Table 20

(Millions of Canadian dollars, except number of)	2018	2017
Total revenue	$ 12,237	$ 11,520
Other information		
Average residential mortgages	235,700	222,500
Average other loans and acceptances, net	80,200	81,400
Average deposits (1)	202,800	195,700
Average credit card balances	18,100	17,000
Credit card purchase volumes	117,900	106,600
Branch mutual fund balances (2)	147,900	148,400
Average branch mutual fund balances	151,500	140,100
AUA – Self-directed brokerage (2)	82,900	79,600
Number of:		
Branches	1,203	1,235
ATMs	4,194	4,290

(1) Includes GIC balances.
(2) 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. Our business banking network has the largest team of relationship managers and specialists in the industry. Our strong commitment to our clients has resulted in our leading market share in business loans and deposits.

Financial performance
Total revenue increased $376 million or 11% compared to last year, largely reflecting higher spreads and average volume growth of 9%.

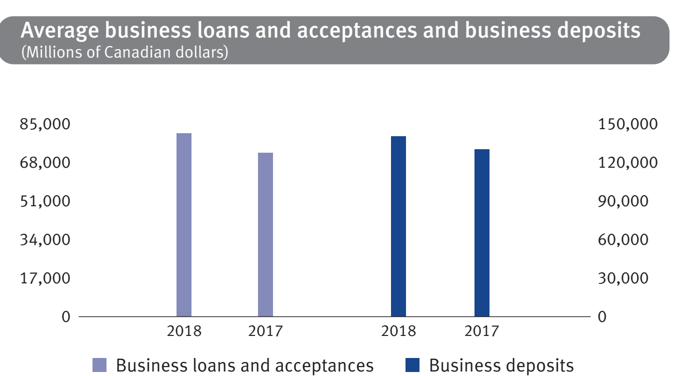
Average loans and acceptances increased 11% and average deposits were up 8%, mainly due to new account acquisitions as well as deepening of our existing client relationships.

Selected highlights — Table 21

(Millions of Canadian dollars)	2018	2017
Total revenue	$ 3,733	$ 3,357
Other information (average)		
Loans and acceptances, net	80,800	72,500
Deposits (1)	140,600	130,400

(1) Includes GIC balances.

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 cross-border 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 down $40 million or 4% from last year, primarily due to lower volumes in Caribbean Banking and the impact of foreign exchange translation.

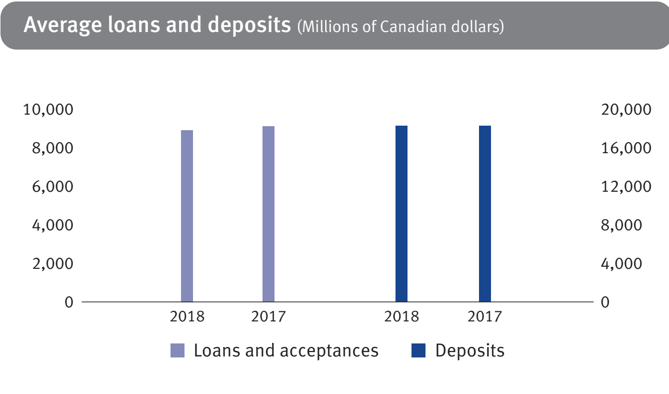
Average loans and acceptances decreased 2%, mainly due to lower client activity and the impact of foreign exchange translation. Average deposits were flat.

Selected highlights — **Table 22**

(Millions of Canadian dollars, except number of and percentage amounts)	2018	2017
Total revenue	$ 946	$ 986
Other information		
NIM	3.95%	3.85%
Average loans and acceptances, net	$ 8,900	$ 9,100
Average deposits	18,300	18,300
AUA (1)	7,700	8,400
Average AUA	8,200	8,400
AUM (1)	4,700	4,600
Number of:		
Branches	57	67
ATMs	269	266

(1) Represents year-end spot balances.

Average loans and deposits (Millions of Canadian dollars)



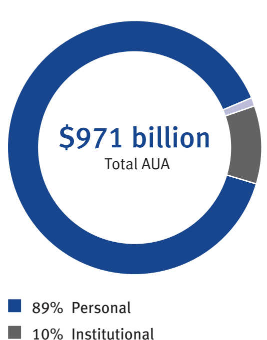
Wealth Management

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

› 5,000
Client-facing advisors

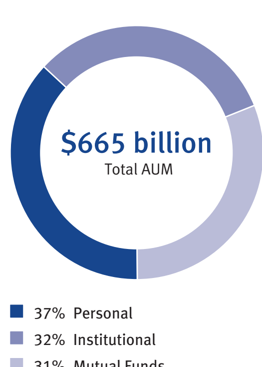
› $30 billion
AUA net flows

Asset under Administration



89% Personal
10% Institutional
1% Mutual Funds

Assets under Management



37% Personal
32% Institutional
31% 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) includes our private client group (PCG) and City National; 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.

2018 Operating environment

- The Bank of Canada and the Fed continued to raise interest rates as the economy returned to full capacity and inflation advanced to target levels.
- The wealth management industry continued to face the challenge of adapting in an environment of rapid technological advancements, stricter regulations, zero-fee products and changing demographics. The mutual fund sector has seen a slowdown in sales due to market volatility in late fiscal 2018 and the rising interest rate environment.
- Growth in our client assets was largely driven by net positive flow of assets reflecting our relationship-focused advisory network, distribution scale and the strength of our brand.
- U.S. businesses benefitted from interest rate increases, the U.S. Tax Reform, strong volume growth and market appreciation.
- We continued to invest in digital solutions to maintain our competitive advantage and increase efficiencies in an environment of rapidly changing client preferences and regulatory requirements.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2018	PRIORITIES IN 2019
In Canada, be the premier service provider for HNW and UHNW clients	Maintained 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) Launched 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 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	Continued to invest in capabilities, technology and talent needed to grow RBC Wealth Management U.S. Continued expansion in City National's existing footprint, as well as solid progress on expanding offerings to select high growth markets with strong RBC Wealth Management and Capital Markets presence, including Washington, D.C. and Minneapolis.	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.
In select global financial centres, become the most trusted regional private bank	Created more tailored value propositions and client coverage for key segments across HNW and UHNW client groups Focused on delivering a differentiated client experience by leveraging our global capabilities	Continue to optimize our product offerings to meet evolving client needs Continue to enhance our distribution capabilities and leverage our global strengths to deliver an exceptional client experience
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 a new Portfolio Review Service – a leading-edge digital tool that leverages GAM expertise in mutual fund research to provide a holistic review of a potential client's assets Reorganized our institutional business to take a more globally unified approach	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 expected to continue to face equity market volatility, and Canadian and U.S. central banks are expected to maintain their hawkish bias in the absence of major economic events. While unemployment rates remain at low levels, consumer spending may be impacted by higher interest rates and household indebtedness. However, we believe we are well-positioned to benefit from our continued focus on delivering a world-class client experience, the strength of our brand, attracting and retaining top-performing client advisors, as well as ongoing investment in technology to drive a digitized and lower cost business model, while gaining market share in HNW and UHNW client segments globally.

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

Wealth Management — Table 23

(Millions of Canadian dollars, except number of, percentage amounts and as otherwise noted)	2018	2017
Net interest income	$ 2,602	$ 2,248
Non-interest income		
Fee-based revenue	6,447	5,799
Transaction and other revenue	1,877	2,028
Total revenue	10,926	10,075
PCL on performing assets (1)	(19)	
PCL on impaired assets (2)	4	34
Total PCL	(15)	34
Non-interest expense	8,070	7,611
Income before income taxes	2,871	2,430
Net income	$ 2,265	$ 1,838
Revenue by business		
Canadian Wealth Management	$ 3,048	$ 2,815
U.S. Wealth Management (including City National)	5,419	4,891
U.S. Wealth Management (including City National) (US$ millions)	4,209	3,744
Global Asset Management	2,092	1,994
International Wealth Management	367	375
Key Ratios		
ROE	16.3%	13.2%
NIM	3.45%	3.02%
Pre-tax margin (3)	26.3%	24.1%
Selected balance sheet and other information		
Average total assets	$ 89,600	$ 88,100
Average loans and acceptances, net	55,500	51,500
Average deposits	92,300	93,100
Attributed capital	13,500	13,450
Other information		
Revenue per advisor (000s) (4)	$ 1,454	$ 1,353
AUA (5), (6)	970,500	929,200
AUM (5)	664,900	634,100
Average AUA	962,600	898,500
Average AUM	664,500	600,400
PCL on impaired loans as a % of average net loans and acceptances (2)	0.01%	0.07%
Number of employees (FTE) (7)	17,975	16,946
Number of advisors (8)	5,042	4,884

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)	2018 vs. 2017
Increase (decrease):	
Total revenue	$ (56)
Non-interest expense	(43)
Net income	(11)
Percentage change in average U.S. dollar equivalent of C$1.00	1%
Percentage change in average British pound equivalent of C$1.00	(3)%
Percentage change in average Euro equivalent of C$1.00	(5)%

(1) PCL on performing assets represents Stage 1 and 2 PCL on all performing assets under IFRS 9, except those classified or designated as FVTPL and equity securities designated as FVOCI. Prior to the adoption of IFRS 9, PCL on performing assets represents PCL for loans not yet identified as impaired and was included in Corporate Support.

(2) PCL on impaired assets includes PCL on credit-impaired loans, acceptances, and commitments (PCL on impaired loans) and PCL on other credit-impaired financial assets. PCL on impaired assets represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39. Stage 3 PCL under IFRS 9 is comprised of lifetime credit losses of all credit-impaired financial assets, except those classified or designated as FVTPL and equity securities designated as FVOCI.

(3) Pre-tax margin is defined as Income before income taxes divided by Total revenue.

(4) Represents investment advisors and financial consultants of our Canadian and U.S. full-service wealth businesses.

(5) Represents year-end spot balances.

(6) In addition to Canadian Wealth Management, U.S. Wealth Management (including City National), and International Wealth Management, amounts also include AUA of $5,800 million (2017: $6,600 million) related to GAM.

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

(8) Represents client-facing advisors across all our wealth management businesses.

Client assets – AUA **Table 24**

(Millions of Canadian dollars)	2018	2017
AUA, beginning balance	$ 929,200	$ 875,300
Asset inflows	292,600	274,300
Asset outflows	(261,600)	(254,800)
Total net flows	31,000	19,500
Market impact	5,600	82,700
Acquisitions/dispositions	(5,700)	(28,200)
Foreign exchange	10,400	(20,100)
Total market, acquisition/dispositions and foreign exchange impact	10,300	34,400
AUA, balance at end of year	$ 970,500	$ 929,200

Client assets – AUM **Table 25**

	2018					2017
(Millions of Canadian dollars)	Money market	Fixed income	Equity	Multi-asset and other	Total	Total
AUM, beginning balance	$ 37,000	$ 198,900	$ 128,700	$ 269,500	$ 634,100	$ 580,700
Institutional inflows	52,100	38,300	6,600	7,500	104,500	68,900
Institutional outflows	(52,800)	(34,600)	(7,600)	(3,500)	(98,500)	(77,300)
Personal flows, net	3,100	1,700	7,100	18,300	30,200	31,400
Total net flows	2,400	5,400	6,100	22,300	36,200	23,000
Market impact	300	(3,100)	(2,100)	(4,300)	(9,200)	42,100
Acquisition/dispositions	–	–	–	–	–	(4,000)
Foreign exchange	500	600	1,300	1,400	3,800	(7,700)
Total market, acquisition/dispositions and foreign exchange impact	800	(2,500)	(800)	(2,900)	(5,400)	30,400
AUM, balance at end of year	$ 40,200	$ 201,800	$ 134,000	$ 288,900	$ 664,900	$ 634,100

AUA by geographic mix and asset class **Table 26**

(Millions of Canadian dollars)	2018	2017
Canada (1)		
Money market	$ 20,500	$ 21,600
Fixed income	35,400	35,700
Equity	86,700	94,300
Multi-asset and other	225,300	208,700
Total Canada	$ 367,900	$ 360,300
U.S. (1)		
Money market	$ 32,600	$ 35,100
Fixed income	133,900	124,500
Equity	264,900	238,100
Multi-asset and other	51,500	45,000
Total U.S.	$ 482,900	$ 442,700
Other International (1)		
Money market	$ 16,100	$ 17,000
Fixed income	12,300	11,400
Equity	49,100	50,100
Multi-asset and other	42,200	47,700
Total International	$ 119,700	$ 126,200
Total AUA	$ 970,500	$ 929,200

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

Financial performance
2018 vs. 2017

Net income increased $427 million or 23%, mainly due to growth in average fee-based client assets, higher net interest income, and a lower effective tax rate reflecting benefits from the U.S. Tax Reform. These factors were partially offset by higher variable compensation on improved results, increased costs related to business growth and technology initiatives, and higher regulatory costs.

Total revenue increased $851 million or 8%, primarily due to growth in average fee-based client assets which benefitted from net sales and market appreciation, and the impact of higher interest rates and volume growth driving higher net interest income. These factors were partially offset by the change in the fair value of the hedge related to our U.S. share-based compensation plan, which was largely offset in non-interest expense.

PCL on impaired loans ratio improved 6 bps, mainly due to lower provisions on impaired loans in U.S. Wealth Management (including City National). For further details on performing and impaired PCL, refer to Credit quality performance in the Credit risk section.

Non-interest expense increased $459 million or 6%, primarily due to higher variable compensation on improved results, increased costs related to business growth and technology initiatives, and higher regulatory costs. These factors were partially offset by the change in the fair value of our U.S. share-based compensation plan, which was largely offset in revenue.

Assets under administration increased $41 billion or 4%, largely due to net sales.

Assets under management increased $31 billion or 5%, primarily reflecting net sales.

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 1,750 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 80 investment counsellors and over 100 trust professionals across Canada.

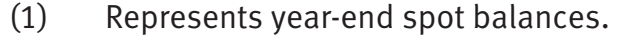
We compete with domestic banks and trust companies, investment counselling firms, bank-owned full-service brokerages and boutique brokerages, mutual fund companies and global private banks. In Canada, bank-owned wealth managers continue to be the major players.

Financial performance

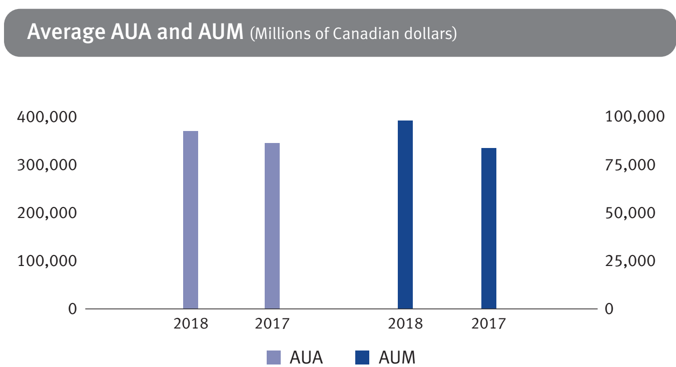
Revenue increased $233 million or 8% from a year ago, primarily due to higher average fee-based client assets reflecting net sales.

Selected highlights **Table 27**

(Millions of Canadian dollars)	2018	2017
Total revenue	$ 3,048	$ 2,815
Other information		
Average loans and acceptances, net	3,600	3,300
Average deposits	17,300	17,400
AUA (1)	368,900	359,600
AUM (1)	100,200	90,400
Average AUA	370,300	344,900
Average AUM	97,900	83,700


(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) includes PCG and City National. Our 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. Additionally, our correspondent and advisor services 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 and our competition includes other broker-dealers, commercial banks and other financial institutions that service HNW and UHNW individuals, entrepreneurs and their businesses.

Financial performance

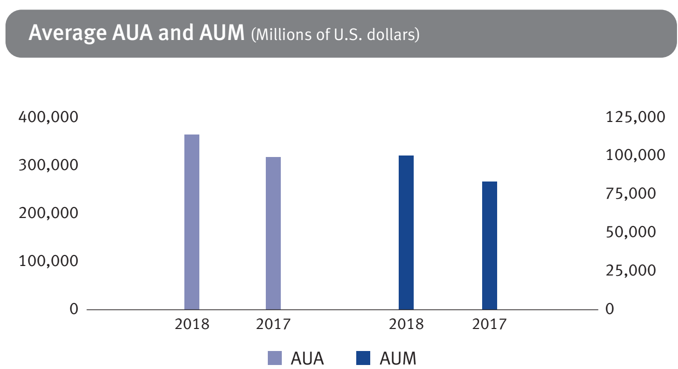
Revenue increased $528 million or 11%, mainly due to volume growth and improved spreads driving higher net interest income, and an increase in average fee-based client assets which benefitted from net sales and market appreciation. These factors were partially offset by the change in the fair value of the hedge related to our U.S. share-based compensation plan, which was largely offset in non-interest expense.

Selected highlights **Table 28**

(Millions of Canadian dollars, except as otherwise noted)	2018	2017
Total revenue	$ 5,419	$ 4,891
Other information (Millions of U.S. dollars)		
Total revenue	4,209	3,744
Average loans, guarantees and letters of credit, net	37,300	33,500
Average deposits	48,600	47,500
AUA (1)	367,100	343,200
AUM (1)	102,900	92,200
Average AUA	366,100	319,100
Average AUM	100,600	83,500

(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.

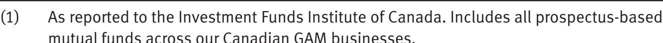
In the U.S., our asset management business offers investment management solutions and services primarily to institutional investors and competes with independent asset management firms, as well as those that are part of national and international banks, and insurance companies.

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 $98 million or 5%, reflecting higher average fee-based client assets due to net sales, partially offset by the change in fair value of seed capital investments, and a loss on an investment in an international asset management joint venture.

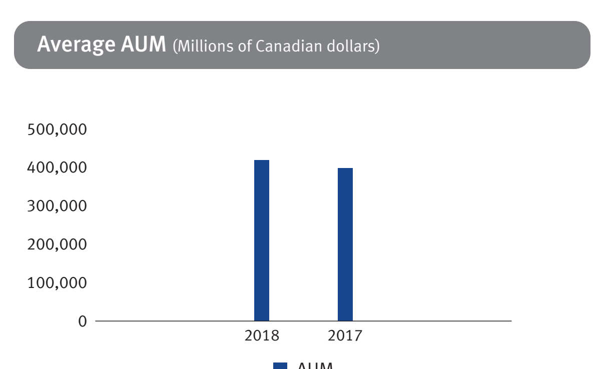
Selected highlights — **Table 29**

(Millions of Canadian dollars)	2018	2017
Total revenue	$ 2,092	$ 1,994
Other information		
Canadian net long-term mutual fund sales (1)	5,908	10,689
Canadian net money market mutual fund sales (redemptions) (1)	562	240
AUM (2)	421,100	415,200
Average AUM	428,200	398,300



(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.

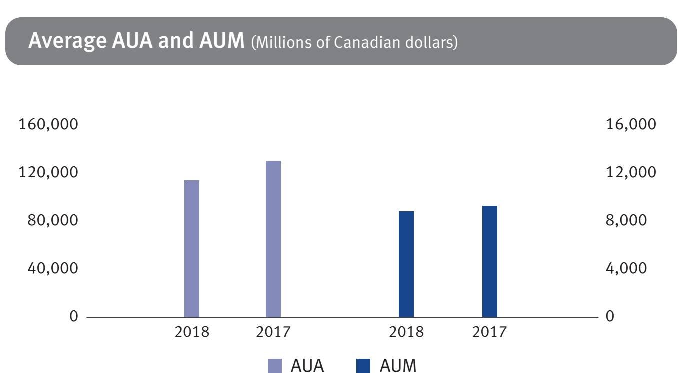
Financial performance
Revenue decreased $8 million or 2%, primarily reflecting lower average fee-based client assets.

Selected highlights — **Table 30**

(Millions of Canadian dollars)	2018	2017
Total revenue	$ 367	$ 375
Other information		
Average loans, guarantees and letters of credit, net	4,800	5,300
Average deposits	12,500	13,700
AUA (1)	112,800	120,300
AUM (1)	8,300	9,400
Average AUA	114,300	130,500
Average AUM	8,800	9,300

(1) Represents year-end spot balances.

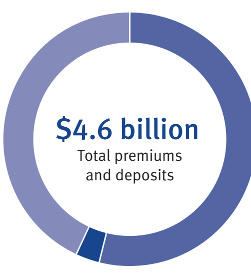
Average AUA and AUM (Millions of Canadian dollars)



Insurance

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

$4.3 billion	> 4 million	2,964
Total revenue	Number of clients	Employees



- 54% Life and Health
- 43% Annuity and Segregated Fund Deposits
- 3% Property and Casualty

Insurance has operations in Canada and globally, operating under two business lines: Canadian Insurance and International Insurance.

In Canada, we offer our products and services through our proprietary distribution channels, comprised of the field sales force, advice centres and online, as well as through independent insurance advisors and affinity relationships.

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

2018 Operating environment

- The insurance industry continues to face a number of challenges and opportunities, including regulatory changes, changing customer preferences and expectations, and increasing technological, digital and mobile transformation in every aspect of the business. Insurers are also refining product and distribution capacities in order to enhance operational efficiencies and manage expenses. To overcome these challenges and take advantage of these opportunities, we continued to invest in digitization to enhance access and convenience, reduce costs, and deliver value to clients beyond traditional insurance products.
- In a rapidly evolving industry, we continue to adapt to maintain strength in the market by providing a holistic set of insurance solutions to our clients.
- Our International Insurance business continues to be impacted by reduced mortality retrocession opportunities and longevity profit margin compression as this market has become highly competitive.
- Our Group Annuity business continues to benefit as companies are transferring defined benefit pension risk to life insurance companies as a way to refocus their efforts and capital on core business strategies and mitigate the volatility of pension costs. We continued to achieve solid growth in 2018 in a highly competitive environment.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2018	PRIORITIES IN 2019
Improve distribution effectiveness and efficiency	In our Life Insurance business, we made progress in ensuring that those in the underinsured market have the opportunity to acquire the Life coverage they need In Group Insurance, we continued to invest in our infrastructure to position us for future growth. We launched the Wellness Program to group health clients as a value-add service Property insurance sales were strong. High Net Worth (HNW) home & auto (RBC Private Insurance®) was launched in April	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	July 1, 2018 marked the two-year anniversary of our Aviva Canada Inc. (Aviva) partnership. With this relationship, our advisors have benefitted from access to a new set of solutions for automobiles, expanded home coverage and insurance solutions for HNW clients and business owners, as well as access to new technology and tools to offer insurance solutions to our clients In 2018, RBC Insurance was ranked highest in client satisfaction in the JD Power Home Study Our Wealth Insurance business continues to gain momentum and RBC Guaranteed Investment Funds continued to be one of the fastest growing segregated fund providers in Canada	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	In 2018, RBC Insurance implemented Life and Disability needs assessment, quoting and application tools to deliver enhanced client experiences on RBCInsurance.com. We also launched an end-to-end eApp that enables straight-through-processing for Simplified Term Life and certain disability products	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	Management continues to implement strategies to improve the profitability of the life reinsurance business. U.K. bulk annuity transactions have increased which is expected to lead to increased longevity reinsurance growth into 2019	Pursue select international opportunities, within our risk appetite, with the aim of continuing to grow our core reinsurance business

Outlook

The insurance industry is expected to continue experiencing tremendous change and disruption in the coming year. Traditional market incumbents will see their market share erode if they do not adapt to forces of change, including: evolving customer preferences and expectations, changing demographics and customer profiles, technological transformation in every area of the business, new distribution models, the emergence of non-traditional competitors, and enhanced compliance requirements.

2018 was another solid year for pension de-risking transactions in the U.K. Generally, pension plans were in a well-funded position in 2018 and competitive group annuity pricing made risk transfer transactions attractive for plan sponsors. Many life insurance companies continue to seek longevity reinsurance to support their group annuity transactions. We will continue to build on our capabilities, expand our portfolio of solutions in the longevity business and diversify our sources of longevity risk to take advantage of continued opportunities for longevity reinsurance growth into 2019 and beyond.

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

Insurance **Table 31**

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2018	2017
Non-interest income		
Net earned premiums	$ 4,032	$ 3,875
Investment income (1)	30	453
Fee income	217	238
Total revenue	4,279	4,566
Insurance policyholder benefits and claims (1)	2,391	2,787
Insurance policyholder acquisition expense	285	266
Non-interest expense	602	584
Income before income taxes	1,001	929
Net income	$ 775	$ 726
Revenue by business		
Canadian Insurance	$ 2,213	$ 2,569
International Insurance	2,066	1,997
Key ratios		
ROE	39.3%	41.8%
Selected balance sheet and other information		
Average total assets	$ 15,800	$ 14,300
Attributed capital	1,950	1,700
Other information		
Premiums and deposits (2)	$ 4,647	$ 4,546
Canadian Insurance	2,584	2,496
International Insurance	2,063	2,050
Insurance claims and policy benefit liabilities	$ 10,000	$ 9,676
Fair value changes on investments backing policyholder liabilities (1)	(435)	(58)
Number of employees (FTE)	2,964	2,691

(1) Investment income can experience volatility arising from fluctuation of FVTPL assets. 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.

(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
2018 vs. 2017

Net income increased $49 million or 7% from a year ago, largely driven by higher favourable investment-related experience and life retrocession contract renegotiations. These factors were partially offset by lower favourable annual actuarial assumption updates, higher claims volumes, and increased costs in support of sales growth and client service activities.

Total revenue decreased $287 million or 6%, primarily due to the change in fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE, as indicated below. This factor was partially offset by business growth, and the impact of restructured international life contracts, which is largely offset in PBCAE.

PBCAE decreased $377 million or 12%, mainly due to the change in fair value of investments backing our policyholder liabilities, higher favourable investment-related experience, and life retrocession contract renegotiations. These factors were partially offset by lower favourable annual actuarial assumption updates, largely related to economic, mortality and longevity experience. Restructured international life contracts, higher claims volumes in both Canadian and International Insurance, and business growth also partially offset the decrease in PBCAE.

Non-interest expense increased $18 million or 3%, largely reflecting increased costs in support of sales growth and client service activities, and strategic initiatives.

Business line review

Canadian Insurance

We offer life, health, travel, home & auto insurance products (in partnership with Aviva), 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.

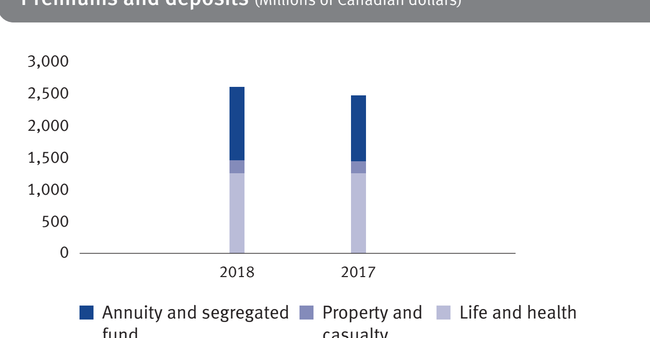
Financial performance

Total revenue decreased $356 million or 14% from last year, primarily reflecting the change in fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE. This factor was partially offset by business growth, primarily reflecting higher revenue from our Life and Health business.

Premiums and deposits increased $88 million or 4%, reflecting growth in our segregated fund and Life and Health businesses, partially offset by lower group annuity sales.

Selected highlights		Table 32
(Millions of Canadian dollars)	2018	2017
Total revenue	$ 2,213	$ 2,569
Other information		
Premiums and deposits		
Life and health (1)	1,280	1,270
Property and casualty	126	119
Annuity and segregated fund deposits (1)	1,178	1,107
Fair value changes on investments backing policyholder liabilities	(434)	(63)

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



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 $69 million or 3%, mainly due to the impact of restructured international life contracts, which is largely offset in PBCAE, and growth in longevity reinsurance.

Premiums and deposits increased $13 million or 1%, as the impact of restructured international life contracts and growth in longevity reinsurance was largely offset by lower life retrocession premiums.

Selected highlights		Table 33
(Millions of Canadian dollars)	2018	2017
Total revenue	$ 2,066	$ 1,997
Other information		
Premiums and deposits		
Life and health	1,225	1,276
Property and casualty	(5)	(1)
Annuity	843	775
Fair value changes on investments backing policyholder liabilities	(1)	5

Investor & Treasury Services

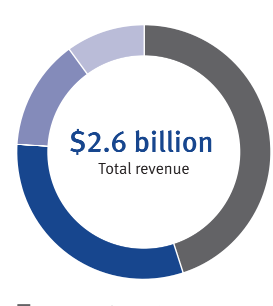
Investor & Treasury Services is a specialist provider of asset services, a leader in Canadian cash management and transaction banking services, and a provider of treasury services to institutional clients worldwide.

$4.3 trillion
Assets under administration

23.5%
Return on equity

$58.6 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 fast-growing and sophisticated asset managers. We compete in selected countries in North America, Europe, the U.K., and Asia-Pacific.

We continue to specialize and create digitally-enabled client-centric products and services. We have top-rated global custody, fund accounting and real estate products and one of the widest transfer agency networks in the market. 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.

2018 Operating environment

- We continued to win new business and retain key clients in the highly competitive global asset services industry.
- Business growth and investment in technology to improve the client experience and our efficiency drove higher costs.

Strategic priorities

OUR STRATEGY	PROGRESS IN 2018	PRIORITIES IN 2019
Be #1 in Canada. Be the undisputed leader of domestic asset, transaction banking and cash management services	We won over 30% more business than the prior year and retained a number of key clients, growing our Canadian asset services revenue and AUA	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 markets. Compete in the asset servicing markets of Luxembourg, Ireland and Australia to support our clients' growth	We achieved record annual sales in Luxembourg and Australia, and increased asset services revenue in Luxembourg, Ireland and Australia	Continue to develop long-term partnerships with sophisticated and fast-growing asset managers
Provide best-in-class products, services and digital experiences for clients. Innovate, automate and collaborate to adapt to evolving client needs and market conditions	We continued to invest in client-focused technology and efficiency initiatives through our Advanced Client Experience (ACE) and our robotics processing automation initiatives We continued to expand our real estate and private equity platform to meet growing demand We redesigned our global sub-custodian network to broaden our partnership network, enhance our service offering and better safeguard our clients' assets	Continue to automate and scale our business to support our clients' growth ambitions Design and deliver digitally-enabled products and services to transform the way we interact with our clients Employ sound risk management practices and commercial insights to mitigate risks in the pursuit of profitable growth Inspire and develop a change-ready workforce

Outlook

In 2019, our focus is to drive top-line growth by continuing to leverage our position in Canada, our recognized capabilities in offshore fund services markets, and our new Australian capabilities, to win new business and deepen existing client relationships. We will continue to execute on our strategic technology initiatives to enhance the client experience as we scale our business to support our clients' growth ambitions. 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.

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 34**

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2018	2017
Net interest income	$ 297	$ 679
Non-interest income	2,294	1,756
Total revenue	2,591	2,435
Non-interest expense	1,618	1,466
Net income before income taxes	973	969
Net income	$ 741	$ 741
Key Ratios		
ROE	23.5%	22.7%
Selected balance sheet information		
Average total assets	$ 132,100	$ 138,100
Average deposits	161,200	132,800
Average client deposits	58,600	54,400
Average wholesale funding deposits	102,600	78,400
Attributed capital	3,100	3,200
Other Information		
AUA (1)	$ 4,283,100	$ 4,266,600
Average AUA	4,377,300	4,044,800
Number of employees (FTE)	4,846	4,771

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

(Millions of Canadian dollars, except percentage amounts)	2018 vs. 2017
Increase (decrease):	
Total revenue	$ 48
Non-interest expense	38
Net income	9
Percentage change in average U.S. dollar equivalent of C$1.00	1%
Percentage change in average British pound equivalent of C$1.00	(3)%
Percentage change in average Euro equivalent of C$1.00	(5)%

(1) Represents period-end spot balances.

Financial performance
2018 vs. 2017
Net income was flat. Improved margins and growth in client deposits and higher revenue in our asset services business was offset by lower funding and liquidity revenue, increased costs in support of business growth, and higher technology investments.

Total revenue increased $156 million or 6%, mainly due to improved margins and growth in client deposits, as well as higher revenue in our asset services business driven by higher client activity and market volatility. The impact of foreign exchange also contributed to the increase. These factors were partially offset by lower funding and liquidity revenue.

Non-interest expense increased $152 million or 10%, mainly due to higher costs in support of business growth mainly reflecting increased staff-related costs, higher investment in technology to drive efficiency, and the impact of foreign exchange translation.

Capital Markets

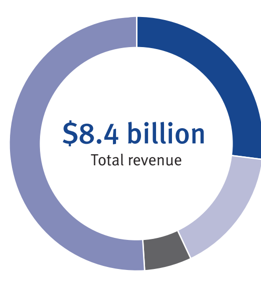
RBC Capital Markets® is a premier global investment bank providing expertise in banking, finance and capital markets to corporations, institutional investors, asset managers, governments and central banks around the world. Our professionals ensure that clients receive the advice, products, and services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

› 14,000
Number of clients

#11
Global league rankings[(1)]

4,162
Employees

Revenue by Geography



- 51% U.S.
- 27% Canada
- 16% U.K. & Europe
- 6% Australia, Asia & other regions

We operate two main business lines, Corporate and Investment Banking and Global Markets. Our legacy portfolio, which has been largely exited, is grouped under Other.

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 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 also have leading capabilities in lending, repo securities, municipal financing, fixed income, currencies & commodities and equities.

Outside North America, we have a select presence in the U.K. and Europe, and Australia, Asia & other markets. We offer a diversified set of capabilities in key sectors of expertise such as energy, mining and infrastructure, industrial, consumer, healthcare and technology in Europe. In the U.K. and Europe, we have continued to grow our senior client coverage teams to compete in our key sectors of expertise with global and regional investment banks. In Australia and Asia, we compete with global and regional investment banks in select products, consisting of fixed income distribution and currencies trading, secured financing and corporate and investment banking.

2018 Operating environment

- The trading environment at the start of fiscal 2018 was characterized by continued low volatility and subdued client activity carried over from the second half of fiscal 2017. An increase in volatility near the end of the first fiscal quarter, driven by trade tensions with the U.S. as well as inflationary concerns, led to favourable market conditions for our equities business. Credit markets remained challenging, however, due to increased levels of market uncertainty surrounding trade tensions as well as interest rate movements.
- The global investment banking fee pool decreased by 2%[(1)] in the fiscal year from the same period a year ago due to decreases in debt and equity origination. The market was impacted by high equity valuations, a rising rate environment and increased geopolitical and global trade risks. However, we saw an increase in loan syndication activity in the latter half of the year and expect to see increased levels of M&A and advisory activity heading into fiscal 2019.
- A constructive credit environment and improvements in the oil & gas and real estate sectors led to lower PCL.

(1) Source: Dealogic, based on global investment bank fees, Fiscal 2018

Strategic priorities

OUR STRATEGY	PROGRESS IN 2018	PRIORITIES IN 2019
Maintain our leadership position in Canada	We deepened key client relationships from our Corporate and Investment Banking businesses to generate additional revenue We continued to win significant mandates including working with Canada Pension Plan Investment Board on its issuance of $1.5 billion of green bonds, which was the first green bond issuance by a pension fund globally We were the exclusive advisor to Canadian Real Estate Investment Trust in their sale to Choice Properties	Continue to focus on deepening client relationships and winning significant mandates as a trusted partner
Expand and strengthen client relationships in the U.S., build on core strengths and capabilities in the U.K. & Europe and optimize performance in Australia, Asia & other regions	We grew our Corporate and Investment Banking presence, and continued to focus on the largest users of Capital Markets' products We continued to win significant mandates by participating in the T-Mobile US$38 billion debt financing to support the merger with Sprint including acting as the Joint Lead Arranger and Joint Book Runner We were appointed Joint Lead Arranger on The Walt Disney Company's US$35.7 billion committed debt financing to support it's US$85.1 billion acquisition of select Twenty First Century Fox assets We advised on Sempra's $9.6 billion acquisition of Energy Fortune Holdings, the largest acquisition in its history In the U.K. & Europe, we maintained momentum throughout the year and improved profitability through repositioning our fixed income business, as well as growing our Corporate and Investment Banking presence in key markets We had our largest ever industrials advisor role in Europe as part of the $14.5 billion Melrose acquisition of GKN plc In Australia, Asia & other regions, we continued to focus on our corporate and investment banking, fixed income trading distribution and foreign exchange trading capabilities	Continue to grow and strengthen our senior coverage teams in the U.S., the U.K. and Europe Focus capital and coverage to deepen relationships with clients that are the most significant users of Capital Markets (top fee payers) Continue to partner with other segments to bring clients one RBC solution, specifically with U.S. Wealth Management (including City National) Drive technology innovation in our Global Markets businesses through electronification, algorithmic trading, artificial intelligence, and other initiatives Enhance our footprint in Frankfurt and Paris to serve clients in Europe
Optimize capital use to earn high risk-adjusted returns on assets and equity	We continued to focus on the 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	Optimize capital use to earn high risk-adjusted returns by maintaining both a balanced approach between investment banking and trading revenue and a disciplined approach to managing the risks and costs of our business

Outlook

In 2019, we expect our investment banking business to benefit from continued investments to expand our presence in the U.S., U.K. and Europe across various industries and from maintaining our leadership position in Canada. Revenue growth is expected to be led by M&A fees. Going forward we expect to see moderate growth in our loan book as it underpins Capital Markets' growth strategy of increasing market share by adding new clients and doing more with existing clients. We anticipate our trading businesses will continue their momentum into 2019, despite challenges presented by margin compression. Expanded regulatory and capital requirements resulting from global banking reforms are driving increased technology investment as well as downward pressure on returns from an increasing capital base, however cost optimization will remain a key focus as well as driving strategic value from these investments.

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

Capital Markets financial highlights — Table 35

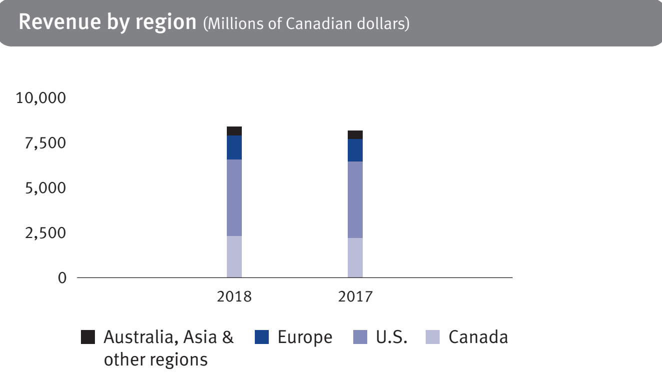
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2018	2017
Net interest income (1)	$ 3,567	$ 3,565
Non-interest income (1)	4,831	4,617
Total revenue (1)	8,398	8,182
PCL on performing assets (2)	(13)	
PCL on impaired assets (3)	61	62
Total PCL	48	62
Non-interest expense	4,960	4,719
Net income before income taxes	3,390	3,401
Net income	$ 2,777	$ 2,525
Revenue by business		
Corporate and Investment Banking	$ 4,113	$ 4,000
Global Markets	4,496	4,466
Other	(211)	(284)
Key ratios		
ROE	13.0%	12.9%
Selected balance sheet and other information		
Average total assets	$ 576,300	$ 494,400
Average trading securities	95,800	91,800
Average loans and acceptances, net	85,000	83,400
Average deposits	70,800	60,200
Attributed capital	20,700	18,850
Other information		
Number of employees (FTE)	4,162	3,970
Credit information		
Gross impaired loans as a % of related loans and acceptances	0.41%	0.63%
PCL on impaired loans as a % of average net loans and acceptances (3)	0.07%	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 and as otherwise noted)	2018 vs. 2017
Increase (decrease):	
Total revenue	$ (34)
Non-interest expense	(15)
Net income	(20)
Percentage change in average U.S. dollar equivalent of C$1.00	1%
Percentage change in average British pound equivalent of C$1.00	(3)%
Percentage change in average Euro equivalent of C$1.00	(5)%

(1) The teb adjustment for 2018 was $542 million (2017 – $548 million). For further discussion, refer to the How we measure and report our business segments section.
(2) PCL on performing assets represents Stage 1 and 2 PCL on all performing assets under IFRS 9, except those classified or designated as FVTPL and equity securities designated as FVOCI. Prior to the adoption of IFRS 9, PCL on performing assets represents PCL for loans not yet identified as impaired and was included in Corporate Support.
(3) PCL on impaired assets includes PCL on credit-impaired loans, acceptances, and commitments (PCL on impaired loans) and PCL on other credit-impaired financial assets. PCL on impaired assets represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39. Stage 3 PCL under IFRS 9 is comprised of lifetime credit losses of all credit-impaired financial assets, except those classified or designated as FVTPL and equity securities designated as FVOCI.

Revenue by region (Millions of Canadian dollars)



Financial performance
2018 vs. 2017

Net income increased $252 million or 10%, driven by a lower effective tax rate reflecting changes in earnings mix and benefits from the U.S. Tax Reform, and higher revenue in Corporate and Investment Banking and Global Markets. These factors were partially offset by higher regulatory costs, litigation recoveries in the prior year, and higher costs in support of business growth.

Total revenue increased $216 million or 3%, largely due to higher equity trading revenue primarily in North America, increased lending revenue in all regions, and increased loan syndication, debt origination, and M&A in Europe. Gains in our legacy U.S. portfolios, higher commodities trading revenue, and higher gains from the disposition of certain securities also contributed to the increase. These factors were partially offset by a decrease in fixed income trading revenue largely in the U.S. and Europe, and lower loan syndication, debt origination and M&A in the U.S.

PCL on impaired loans ratio was flat. For further details, refer to the Credit quality performance section.

Non-interest expense increased $241 million or 5%, largely due to higher regulatory costs, litigation recoveries in the prior year, and increased costs in support of business growth. Higher costs related to changes in the timing of deferred compensation, increased technology and related costs, and higher compensation on improved results also contributed to the increase.

Business line review

Corporate and Investment Banking

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

Financial performance

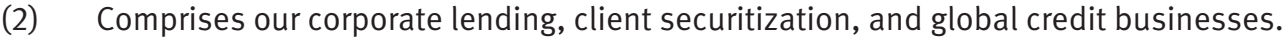
Corporate and Investment Banking revenue of $4,113 million increased $113 million as compared to last year.

Investment banking revenue decreased $33 million or 2%, primarily due to lower loan syndication, debt origination, and M&A in the U.S. These factors were partially offset by higher loan syndication, debt origination, and M&A in Europe and increased municipal banking activity.

Lending and other revenue increased $146 million or 8%, reflecting loan growth and improved credit conditions.

Selected highlights — Table 36

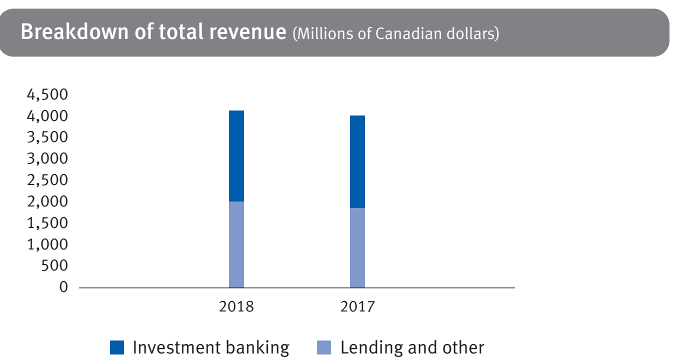
(Millions of Canadian dollars)	2018	2017
Total revenue (1)	$ 4,113	$ 4,000
Breakdown of revenue (1)		
Investment banking	2,107	2,140
Lending and other (2)	2,006	1,860
Other information		
Average assets	74,400	67,900
Average loans and acceptances, net	61,100	60,500



(1) The teb adjustment for the year ended October 31, 2018 was $224 million (October 31, 2017 – $229 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 $4,496 million increased $30 million.

Revenue in our Fixed income, currencies and commodities business decreased $131 million or 6%, mainly due to lower fixed income trading revenue primarily in Europe and the U.S.

Revenue in our Equities business increased $52 million or 5%, primarily due to increased equity trading revenue mainly in North America, partially offset by lower volume in our cash equities businesses in the U.S.

Revenue in our Repo and secured financing business increased $108 million or 10%, mainly due to increased client activity.

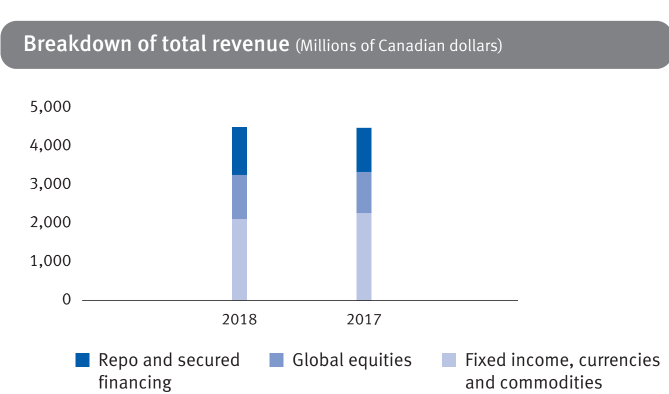
Selected highlights — Table 37

(Millions of Canadian dollars)	2018	2017
Total revenue (1)	$ 4,496	$ 4,466
Breakdown of revenue (1)		
Fixed income, currencies and commodities	2,122	2,253
Equities	1,136	1,084
Repo and secured financing (2)	1,238	1,129
Other information		
Average assets	508,900	435,500

(1) The teb adjustment for the year ended October 31, 2018 was $318 million (October 31, 2017 – $319 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. In recent years we have significantly reduced several of our legacy portfolios. Our legacy portfolio assets decreased by 48% as compared to last year.

Financial performance

Revenue increased $73 million as compared to last year largely due to gains in our legacy U.S. portfolios.

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, and Functions, which includes our finance, human resources, risk management, internal audit and other functional groups. Reported results for Corporate Support mainly reflect certain activities related to monitoring and oversight of enterprise activities which are not allocated to business segments. Corporate Support also includes our Corporate Treasury function. For further details, refer to the How we measure and report our business segments section.

Corporate Support — **Table 38**

(Millions of Canadian dollars, except as otherwise noted)	2018	2017
Net interest income (loss) (1)	$ (51)	$ (139)
Non-interest income (loss) (1)	(483)	(313)
Total revenue (1)	(534)	(452)
Non-interest expense	58	238
Net income (loss) before income taxes (1)	(592)	(690)
Income taxes (recoveries) (1)	(437)	(574)
Net income (loss) (2)	$ (155)	$ (116)

(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, 2018 was $22 million (October 31, 2017 – $35 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 period.

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, 2018 was $542 million and $548 million last year.

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

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.

2017
Net loss was $116 million, largely reflecting severance and related charges, net unfavourable tax adjustments, and legal costs. These factors were partially offset by asset/liability management activities.

Quarterly financial information

Fourth quarter performance

Q4 2018 vs. Q4 2017
Fourth quarter net income of $3,250 million was up $413 million or 15% from last year. Diluted EPS of $2.20 was up $0.32 and ROE of 17.6% was up 100 bps. Our fourth quarter earnings increased due to higher results in Personal & Commercial Banking, Capital Markets, Wealth Management, and Insurance. Investor & Treasury Services earnings remained relatively consistent with the prior period.

Total revenue increased $146 million or 1%, largely due to net interest income reflecting the impact of higher interest rates and volume growth in Canadian Banking and U.S. Wealth Management (including City National), growth in average fee-based assets reflecting net sales, the impact of foreign exchange translation, and higher equity trading revenue in North America. Higher group annuity sales, which are largely offset in PBCAE, and higher card service revenue also contributed to the increase. These factors were partially offset by the change in fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE, and the change in the fair value of the hedge related to our U.S. share-based compensation plan, which is largely offset in Non-interest expense.

Total PCL increased $119 million and the PCL ratio on loans of 23 bps increased 6 bps from last year, mainly due to higher provisions in Capital Markets and Personal & Commercial Banking due to the adoption of IFRS 9 on November 1, 2017, as well as higher provisions on impaired loans in Capital Markets due to recoveries in the prior year.

PBCAE decreased $643 million, largely reflecting the change in fair value of investments backing our policyholder liabilities, which was largely offset in revenue, higher favourable investment-related experience and life retrocession contract renegotiations. These factors were partially offset by lower favourable annual actuarial assumption updates, largely related to economic, mortality and longevity experience, and higher group annuity sales, which was largely offset in revenue.

Non-interest expense increased $271 million or 5%, primarily reflecting increased costs in support of business growth and technology and related costs, including digital initiatives. Higher staff-related costs, including variable compensation on improved results, and the impact of foreign exchange translation also contributed to the increase. These factors were partially offset by the change in the fair value of our U.S. share-based compensation plan, which was largely offset in revenue.

Income tax expense decreased $14 million from last year, despite higher earnings before tax. The effective income tax rate decreased from 19.9% last year to 17.5%, due to the impact of the U.S. tax reform, changes in earnings mix and higher net favourable tax adjustments.

Q4 2018 vs. Q3 2018
Net income of $3,250 million was up $141 million or 5% compared to the prior quarter, due to life retrocession contract renegotiations in Insurance, higher earnings in Personal & Commercial Banking from higher spreads and average volume growth in loans and deposits in Canadian Banking, and lower compensation on decreased results in Capital Markets. Higher net favourable tax adjustments, higher favourable investment-related experience and favourable annual actuarial assumption updates in Insurance, and higher average fee-based client assets reflecting net sales in Wealth Management also contributed to the increase. These factors were partially offset by lower fixed income trading revenue, primarily in North America, higher marketing costs in Personal & Commercial Banking, and higher costs in support of business growth in Wealth Management.

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 39**

(Millions of Canadian dollars, except per share and percentage amounts)	2018				2017			
	Q4	Q3	Q2	Q1	Q4	Q3	Q2	Q1
Personal & Commercial Banking	**$ 4,364**	$ 4,284	$ 4,103	$ 4,165	$ 4,019	$ 3,970	$ 3,798	$ 4,076
Wealth Management	**2,740**	2,798	2,605	2,783	2,562	2,547	2,481	2,485
Insurance	**1,039**	1,290	806	1,144	1,612	1,009	1,448	497
Investor & Treasury Services	**624**	620	671	676	602	594	608	631
Capital Markets (2)	**2,056**	2,157	2,010	2,175	1,954	2,040	2,117	2,071
Corporate Support (2)	**(154)**	(124)	(141)	(115)	(226)	(72)	(40)	(114)
Total revenue	**$ 10,669**	$ 11,025	$ 10,054	$ 10,828	$ 10,523	$ 10,088	$ 10,412	$ 9,646
PCL (3)	**353**	346	274	334	234	320	302	294
PBCAE	**494**	925	421	836	1,137	643	1,090	183
Non-interest expense	**5,882**	5,858	5,482	5,611	5,611	5,537	5,331	5,315
Net income before income taxes	**$ 3,940**	$ 3,896	$ 3,877	$ 4,047	$ 3,541	$ 3,588	$ 3,689	$ 3,854
Income taxes	**690**	787	817	1,035	704	792	880	827
Net income	**$ 3,250**	$ 3,109	$ 3,060	$ 3,012	$ 2,837	$ 2,796	$ 2,809	$ 3,027
EPS – basic	**$ 2.21**	$ 2.10	$ 2.06	$ 2.02	$ 1.89	$ 1.86	$ 1.86	$ 1.98
– diluted	**2.20**	2.10	2.06	2.01	1.88	1.85	1.85	1.97
Segments – net income (loss)								
Personal & Commercial Banking	**$ 1,538**	$ 1,510	$ 1,459	$ 1,521	$ 1,404	$ 1,399	$ 1,360	$ 1,592
Wealth Management	**553**	578	537	597	491	486	431	430
Insurance	**318**	158	172	127	265	161	166	134
Investor & Treasury Services	**155**	155	212	219	156	178	193	214
Capital Markets	**666**	698	665	748	584	611	668	662
Corporate Support	**20**	10	15	(200)	(63)	(39)	(9)	(5)
Net income	**$ 3,250**	$ 3,109	$ 3,060	$ 3,012	$ 2,837	$ 2,796	$ 2,809	$ 3,027
Effective income tax rate	**17.5%**	20.2%	21.1%	25.6%	19.9%	22.1%	23.9%	21.5%
Period average US$ equivalent of C$1.00	**$ 0.767**	$ 0.767	$ 0.778	$ 0.794	$ 0.792	$ 0.770	$ 0.746	$ 0.752

(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.
(3) Under IFRS 9, PCL relates primarily to loans, acceptances, and commitments, and also applies to all financial assets except for those classified or designated as FVTPL and equity securities designated as FVOCI. Prior to the adoption of IFRS 9, PCL related only to loans, acceptances, and commitments. PCL on loans, acceptances, and commitments is comprised of PCL on impaired loans (Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39) and PCL on performing loans (Stage 1 and Stage 2 PCL under IFRS 9 and PCL on loans not yet identified as impaired under IAS 39). Refer to the Credit risk section and Note 2 of our 2018 Annual Consolidated Financial Statements for further details.

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 and our Wealth Management investment management business.

Specified items affecting our consolidated results
- In the first quarter of 2017, our results included our share of a gain related to the sale of the U.S. operations of Moneris of $212 million (before- and after-tax).

Trend analysis
Earnings have generally trended upward over the period. Quarterly earnings are also affected by foreign currency translation.

Personal and Commercial Banking revenue has benefitted from solid volume growth, higher spreads since the latter half of 2017, and higher fee-based revenue. The first quarter of 2017 was impacted by our share of a gain related to the sale of Moneris, as noted previously.

Wealth Management revenue has generally trended upwards primarily due to growth in average fee-based client assets which benefitted from net sales and market appreciation, and the impact of higher interest rates and volume growth driving higher net interest income since the first half of 2017. The second and fourth quarter of 2018 were adversely impacted by the change in the fair value of the hedge related to our U.S. share-based compensation plan, which was largely offset in Non-interest expense.

Insurance revenue fluctuated over the period, primarily due to the impact of changes in the fair value of investments backing our policyholder liabilities. Revenues also benefitted from the impact of new group annuity and restructured international life contracts, which are largely offset in PBCAE.

Investor and Treasury Services revenue was stable throughout the period, with the first half of 2018 experiencing higher trends due to generally higher market volatility, growth in client deposits, and increased client activity from our asset services business, combined with an increase in funding & liquidity performance driven by higher spreads generally experienced in the first quarter of each year.

Capital Markets revenue is influenced, to a large extent, by market conditions and activity in the equity trading business, 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, primarily in North America.

PCL saw a general improvement in 2017 due to lower provisions and higher recoveries in our Capital Markets and Canadian Banking portfolios. On November 1, 2017, we adopted IFRS 9, which resulted in the introduction of PCL on performing financial assets. This was partially offset by lower PCL on impaired loans in Capital Markets and U.S. Wealth Management (including City National) for the majority of 2018. However, the fourth quarter of 2018 was impacted by higher provisions on impaired loans in Capital Markets, and the restructuring of portfolios in Barbados.

PBCAE has fluctuated quarterly as it includes the changes to the fair value of investments backing our policyholder liabilities, the impact of group annuity sales and restructured international life contracts, all of which are largely offset in Revenue. PBCAE has also increased due to business growth, and has been impacted by investment-related experience, and claims volumes over the period. The results are impacted by actuarial adjustments, which generally occur in the fourth quarter of each year.

While we continue to focus on efficiency management activities, Non-interest expense has generally trended upwards over the period. Growth in Non-interest expense mainly reflects higher variable compensation on improved results in Wealth Management and Capital Markets, as well as higher costs in support of business growth and our ongoing investments in technology, including digital initiatives. The first quarter of 2017 included an impairment related to properties held for sale, while the third quarter of 2017 was impacted by higher severance costs. Fiscal 2018 has been impacted by higher regulatory and compliance costs. In addition, the decrease over the second and fourth quarter of 2018 mainly reflects the change in the fair value of our U.S. share-based compensation plan, which was largely offset in Revenue.

Our effective income tax rate has fluctuated over the period, mostly due to varying levels of income reported in jurisdictions with different tax rates, as well as fluctuating levels of income from tax-advantaged sources and various levels of tax adjustments. 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 by the ongoing lower corporate tax rate in fiscal 2018. Our effective income tax rate has generally been impacted over the period by higher favourable tax adjustments, lower tax-exempt income, and changes to the earnings mix.

Financial condition

Condensed balance sheets

Table 40

(Millions of Canadian dollars)	2018	2017
Assets		
Cash and due from banks	$ 30,209	$ 28,407
Interest-bearing deposits with banks	36,471	32,662
Securities, net of applicable allowance (1)	222,866	218,379
Assets purchased under reverse repurchase agreements and securities borrowed	294,602	220,977
Loans		
Retail	399,452	385,170
Wholesale	180,278	159,606
Allowance for loan losses	(2,912)	(2,159)
Other – Derivatives	94,039	95,023
– Other (2)	79,729	74,788
Total assets	$ 1,334,734	$ 1,212,853
Liabilities		
Deposits	$ 837,046	$ 789,635
Other – Derivatives	90,238	92,127
– Other (2)	318,364	247,398
Subordinated debentures	9,131	9,265
Total liabilities	1,254,779	1,138,425
Equity attributable to shareholders	79,861	73,829
Non-controlling interests	94	599
Total equity	79,955	74,428
Total liabilities and equity	$ 1,334,734	$ 1,212,853

(1) Securities are comprised of trading and investment securities. Under IFRS 9, investment securities represent debt and equity securities at FVOCI and debt securities at amortized cost, net of the applicable allowance. Under IAS 39, investment securities represented available-for-sale securities and held-to-maturity securities. For further details on the impacts of the adoption of IFRS 9, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

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

2018 vs. 2017

Total assets increased $122 billion or 10% from October 31, 2017. Foreign exchange translation increased total assets by $15 billion.

Cash and due from banks was up $2 billion or 6%, mainly due to higher deposits with central banks reflecting our cash management requirements.

Interest-bearing deposits with banks increased $4 billion or 12%, primarily due to higher deposits with central banks reflecting our cash management activities.

Securities, net of applicable allowance, were up $4 billion or 2%, largely driven by the change in classification of certain securities in loans and receivables to investment securities as a result of adopting IFRS 9 and the impact of foreign exchange translation. These factors were partially offset by lower government debt securities reflecting our cash management and liquidity requirements.

Assets purchased under reverse repurchase agreements (reverse repos) and securities borrowed increased $74 billion or 33%, mainly attributable to increased client activities.

Loans (net of Allowance for loan losses) were up $34 billion or 6%, largely due to volume growth, which led to higher wholesale loans and residential mortgages, partially offset by the reclassification of certain securities in loans and receivables to investment securities as mentioned above.

Derivative assets were down $1 billion or 1%.

Other assets were up $5 billion or 7%.

Total liabilities increased $116 billion or 10% from October 31, 2017. Foreign exchange translation increased total liabilities by $15 billion.

Deposits increased $47 billion or 6%, mainly as a result of higher business and retail deposits due to increased client demand, higher issuances of fixed term notes driven by funding requirements, and higher bank deposits due to increased client activity.

Derivative liabilities were down $2 billion or 2%, mainly attributable to lower fair values on foreign exchange contracts and interest rate swaps, partially offset by the impact of foreign exchange translation.

Other liabilities increased $71 billion or 29%, mainly due to higher obligations related to repurchase agreements due to client activity.

Total equity increased $6 billion or 7% reflecting earnings, net of dividends and share repurchases, partially offset by our adoption of IFRS 9 which resulted in a decrease in equity of $637 million. For further details on the impacts of the adoption of IFRS 9, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

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. As at October 31, 2018, we derecognized $1.3 billion (October 31, 2017 – $1.2 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 2018 Annual Consolidated Financial Statements.

We periodically securitize residential mortgage loans for the Canadian social housing program through the NHA MBS program, which are derecognized from our Consolidated Balance Sheets when sold to third-party investors. During 2018, there were no securitization activities of residential mortgage loans for the Canadian social housing program (October 31, 2017 – $13 million).

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, 2018, we securitized $352 million of commercial mortgages (October 31, 2017 – $407 million). Our continuing involvement with the transferred assets is limited to servicing certain of the underlying commercial mortgages sold. As at October 31, 2018, there was $1.5 billion of commercial mortgages outstanding that we continue to service related to these securitization activities (October 31, 2017 – $1.4 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 2018 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 $262 million during the year (October 31, 2017 – $287 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 41**

	2018				2017			
As at October 31 (Millions of Canadian dollars)	Notional of committed amounts (1)	Allocable notional amounts	Outstanding loans (2)	Maximum exposure to loss (3)	Notional of committed amounts (1)	Allocable notional amounts	Outstanding loans (2)	Maximum exposure to loss (3)
Backstop liquidity facilities	$ 38,342	$ 36,193	$ –	$ 36,193	$ 38,622	$ 35,981	$ 371	$ 36,352
Credit enhancement facilities	2,149	2,149	–	2,149	2,270	2,270	–	2,270
Total	$ 40,491	$ 38,342	$ –	$ 38,342	$ 40,892	$ 38,251	$ 371	$ 38,622

(1) Based on total committed financing limit.
(2) Net of allowance for loan losses and write-offs.
(3) Not presented in the table above are derivative assets with a fair value of $nil (October 31, 2017 – $17 million) 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 2018 Annual Consolidated Financial Statements for more details.

As at October 31, 2018, the notional amount of backstop liquidity facilities we provide decreased by $280 million or 1% from last year. The decrease in the amount of backstop liquidity facilities provided to the multi-seller conduits as compared to last year was primarily due to decreases in the outstanding securitized assets of the multi-seller conduits partially offset by foreign exchange translation. The notional amount of partial credit enhancement facilities we provide decreased by $121 million from last year. The decrease in the credit enhancement facilities reflects decreased client usage. Total loans extended to the multi-seller conduits under the backstop liquidity facilities decreased by $371 million from last year primarily due to principal repayments.

Maximum exposure to loss by client type **Table 42**

	2018			2017		
As at October 31 (Millions of dollars)	US$	C$	Total (C$)	US$	C$	Total (C$)
Outstanding securitized assets						
Credit cards	$ 4,406	$ 510	$ 6,308	$ 4,058	$ 510	$ 5,745
Auto loans and leases	10,726	2,148	16,260	10,597	3,113	16,783
Student loans	1,707	–	2,246	1,747	–	2,253
Trade receivables	2,220	–	2,921	2,358	–	3,042
Asset-backed securities	–	–	–	287	–	371
Equipment receivables	1,581	–	2,080	1,402	–	1,809
Consumer loans	1,387	–	1,825	1,267	–	1,634
Dealer floor plan receivables	833	852	1,948	939	852	2,064
Fleet finance receivables	614	306	1,113	766	306	1,294
Insurance premiums	122	194	355	134	163	336
Residential mortgages	–	1,377	1,377	–	1,377	1,377
Transportation finance	1,335	153	1,909	1,346	179	1,914
Total	$ 24,931	$ 5,540	$ 38,342	$ 24,901	$ 6,500	$ 38,622
Canadian equivalent	$ 32,802	$ 5,540	$ 38,342	$ 32,122	$ 6,500	$ 38,622

Our overall exposure decreased by 1% compared to last year, primarily reflecting a decrease in the outstanding securitized assets of the multi-seller conduits, partially offset foreign exchange translation. Correspondingly, total assets of the multi-seller conduits decreased by $281 million or 1% over last year, primarily due to decreases in the Auto loans and leases, Asset-backed securities and Fleet finance receivables asset classes, which were partially offset by increases in the Credit card and Equipment 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, 2018, the total asset-backed commercial paper (ABCP) issued by the conduits amounted to $24.9 billion, an increase of $107 million or 0.4% from last year. The increase in the amount of ABCP issued by the multi-seller conduits compared to last year is primarily due to foreign exchange translation. The rating agencies that rate the ABCP rated 71% (October 31, 2017 – 70%) of the total amount issued within the top ratings category and the remaining amount in the second highest 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, 2018 was $176 million (October 31, 2017 – $443 million). The decrease in our maximum exposure to loss is primarily related to the sale 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, 2018, our maximum exposure to loss from these unconsolidated municipal bond TOB trusts was $2.4 billion (October 31, 2017 – $1.7 billion). The increase in our maximum exposure to loss relative to last year is primarily due to additional TOB 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, 2018, our maximum exposure to loss associated with the outstanding senior warehouse financing facilities was $837 million (October 31, 2017 – $263 million). The increase in our maximum exposure to loss relative to last year is related to the addition of new financing facilities. We provide senior financing to unaffiliated structured entities to acquire loans. As at October 31, 2018, our maximum exposure to loss associated with the outstanding senior financing facilities was $1.8 billion (October 31, 2017 – $1.2 billion). The increase in our maximum exposure to loss relative to last year is related to 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, 2018, our maximum exposure to loss was $2.7 billion (October 31, 2017 – $2.9 billion).

We also provide liquidity facilities to certain third-party investment funds. The funds issue unsecured variable-rate preferred shares and invest in portfolios of tax exempt bonds. As at October 31, 2018, our maximum exposure to these funds was $275 million (October 31, 2017 – $268 million). The increase in our maximum exposure compared to last year is due to the impact of foreign currency translation.

Third-party securitization vehicles

We hold interests in certain unconsolidated third-party securitization vehicles, which are structured entities. We, as well as other financial institutions, are obligated to provide funding to these entities up to our maximum commitment level and are exposed to credit losses on the underlying assets after various credit enhancements. As at October 31, 2018, our maximum exposure to loss in these entities was $10.2 billion (October 31, 2017 – $6.1 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 $126 million (October 31, 2017 – $87 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, 2018 amounted to $392.7 billion compared to $348.8[1] billion last year. The increase compared to last year relates primarily to business growth in securities lending indemnifications, other credit-related commitments, and by the impact of foreign exchange translation. Refer to Liquidity and funding risk and Note 24 of our 2018 Annual Consolidated Financial Statements for details regarding our guarantees and commitments.

Risk management

Overview

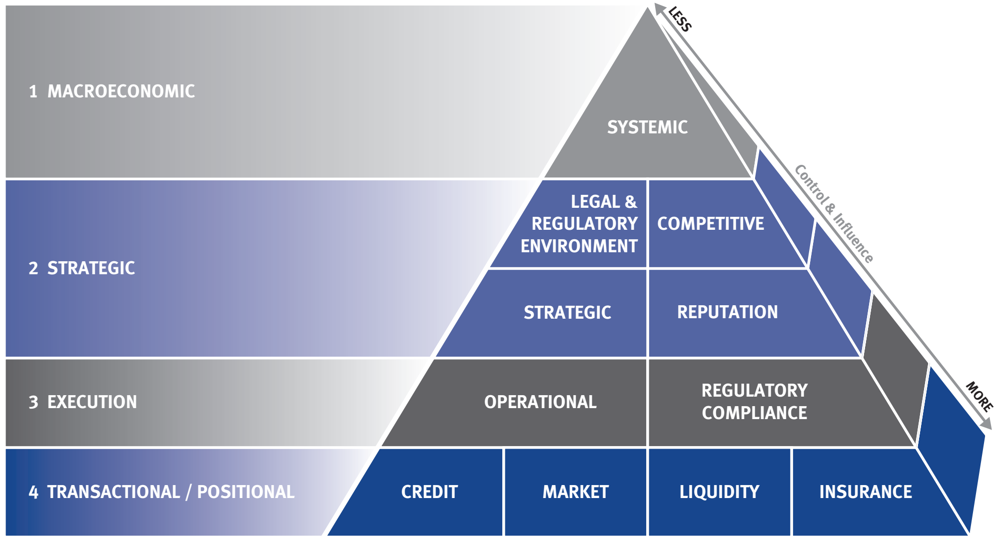
We are in the business of managing the risks inherent to the financial services industry as we aim to create maximum value for our shareholders, clients, employees and communities. The ability to manage risk is a core competency of the bank, and is supported by our strong risk conduct and culture and an effective risk management approach. 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 organizational design and governance processes ensure that our Group Risk Management (GRM) function is independent from the businesses it supports.

We ensure that business activities and transactions provide an appropriate balance of return for the risks assumed and remain within our risk appetite, which is collectively managed across RBC, through adherence to our Enterprise Risk Appetite Framework (ERAF). Our major principal risks include credit, market, liquidity, insurance, operational, regulatory compliance, strategic, reputation, legal and regulatory environment, competitive, and systemic risks.

[1] Amounts have been revised from those previously presented.

Risk pyramid

Our risk pyramid identifies the principal risks the organization faces and provides a common language and discipline for the identification and assessment of risk in existing businesses, new businesses, products or initiatives, and acquisitions and alliances. It is maintained by GRM and reviewed regularly to ensure all key risks are reflected and ranked appropriately. The placement of the principal risks within the risk pyramid is a function of two primary criteria: risk drivers and level of control and influence.



Risk drivers

Risk drivers are key factors that would have a strong influence on whether or not one or more of our risks will materialize, which include the following:

1. Macroeconomic: Adverse changes in the macroeconomic environment can lead to a partial or total collapse of 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.
2. Strategic: Business strategy is a major driver of our risk appetite and the strategic choices and capital allocations we make determine how our risk profile changes. Examples include acquisitions, responding to the threats posed by non-traditional competitors and responding to proposed changes in regulatory frameworks. These choices also impact our revenue mix, affecting our exposure to earnings volatility and loss absorption capacity.
3. Execution: The complexity and scope of our operations across the globe exposes us to operational and regulatory compliance risks, including fraud, anti-money laundering, cybersecurity and conduct/fiduciary risk.
4. Transactional/Positional: This driver of risk presents a more traditional risk perspective. This involves the risk of credit or market losses arising from the lending of transactions and balance sheet positions we undertake every day.

Control and influence

The risk types are organized vertically from the top of the pyramid to its base according to the relative degree of control and influence we consider to have over each risk driver.

The risk categories along the base level of our risk pyramid are those over which we have the greatest level of control and influence. We understand these risks and earn revenue by taking them. These are credit, market, liquidity and insurance risks. Operational risk and regulatory compliance risk, while still viewed as risks over which we have a greater level of control and influence, are ranked higher on the pyramid than the other more controllable risks. This ranking acknowledges the level of controllability associated with people, systems and external events.

Strategic risk generally arises from us either choosing the wrong strategy, or poorly executing on the right strategy. Both strategic risk and reputation risk are placed near the middle of the pyramid to denote the fair degree of control and influence we can exert in managing these risk types relative to others. Legal and regulatory environment and competitive risks, which can be viewed as somewhat controllable, can be influenced through our role as a corporate entity, and as an active participant in the Canadian and global financial services industry.

Systemic risk is placed at the top of our risk pyramid, which we consider to be the least controllable type of risk arising from the business environment in which we operate. However, we have controls in place for mitigating the impacts of systemic risk such as our diversified business model and funding sources, financial crisis management strategies and protocols, stress testing programs, and product and geographic diversification.

Top and emerging risks

Our view of risks is not static. 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.

Identification of top and emerging risks occurs in the course of business development and as part of the execution of risk oversight responsibilities by risk owners and risk oversight stakeholders.

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.

Top Risks	Description
Information Technology and Cyber Risks	Information technology (IT) and cyber risks remained as key risks, not only for the financial services sector, but for other industries worldwide. Due to the size, scale, and global nature of our operations, our heavy reliance on the internet to conduct day-to-day business activities, and our evolving intricate technological infrastructure, we are subject to heightened risks in the form of cyber-attacks, data breaches, cyber extortion and similar compromises. Our use of third party service providers, which are also subject to these potential compromises, increases our risk of a potential attack, breach or disruption as we have less immediate oversight over their IT domain. 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 continues 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 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.
Global Uncertainty	Global uncertainty remained a top risk throughout 2018. The U.S. administration continued to advocate for policy changes, particularly those related to trade which added to overall global uncertainty and volatility. The Canadian economy continues to face specific risks with respect to the evolving trade environment. Concerns also remain around the social, political and economic impacts of the changing political landscape in Europe, including the final outcome of Brexit negotiations. In addition, there are growing concerns over an economic slowdown in emerging markets in light of capital outflows in favour of developed markets and expected interest rate increases. Broader geopolitical tensions remained high amongst the U.S., Russia, China, and across the Middle East.
Canadian Housing and Household Indebtedness	While the Canadian economy continued to grow and low unemployment rates prevailed this fiscal year, the housing market remained a concern for the Canadian financial system, although at a diminishing level. Overall housing prices stayed elevated and affordability remained stretched. The measures implemented by the Canadian government and regulators over the past two years to help safeguard homebuyers and financial institutions alike did have the desired effect of cooling the market and returning balance to demand-supply conditions. Annual price gains decelerated to low single-digits in key markets, specifically across both the Greater Toronto Area and Greater Vancouver Area. However, as the BoC continues to be on a path of gradually raising interest rates, this could have materially negative credit implications for our broader consumer lending activities in the future given current levels of elevated household indebtedness.
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 on stream in multiple jurisdictions continue to provide challenges and impact our operations and strategies.

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. We are actively monitoring our emerging risks, which include the following:

Emerging Risks	Description
Digital Disruption and Innovation	Evolving consumer behaviour, the expansion of online shopping and the emergence of disruptors are creating competitive pressures across a number of sectors. In addition, established technology companies, newer competitors, and regulatory changes continue to foster new business models that could challenge traditional banks and financial products. The adoption of new technologies, such as Artificial Intelligence, Robotic Process Automation (RPA) and Blockchain could result in new and complex risks that would need to be managed effectively. We identify, assess, and manage the risks of emerging technologies prior to their adoption.
Data and Third Party Related Risks	The management, use, and protection of data are becoming increasingly important, particularly given the adoption of the General Data Protection Regulation (GDPR) by the EU and its implementation in 2018, and the expected proliferation of similar regulatory frameworks in other markets. Further, as we increasingly partner with third parties, our potential exposure to regulatory compliance, operational and reputational risk increases. For details on how we are managing these risks, refer to the Operational risk section.
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 climate sensitive sectors. For details on how we are managing these risks, refer to the Operational risk and Environment and social risk sections.

Enterprise risk management

Under the oversight of the Board of Directors and senior management, the Enterprise Risk Management Framework 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. While our risk appetite encompasses what and how much risk we are able and willing to take, our risk conduct and culture articulates how we expect to take those risks.

Risk governance

The risk governance model is well-established. The Board of Directors 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 mandate. As shown below, we use the three lines of defence governance model to manage risks across the enterprise.

- The Board of Directors (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 purpose of the Risk Committee is to oversee 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 serves as our conduct review committee. 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, as well as compensation risk management. It also oversees our pension plans, key talent management strategies and practices, and management succession plans.

- 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 alignment of strategic planning, financial planning, capital planning and risk appetite.
- 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 Principles for Sound Compensation Practices and Implementation Standards (FSB Principles) and other applicable guidance and best practices.

- Business and Support Functions embedded in the business
- Accountable for:
  - Identification;
  - Assessment;
  - Mitigation;
  - Monitoring; and
  - Reporting of risk against approved policies and appetite

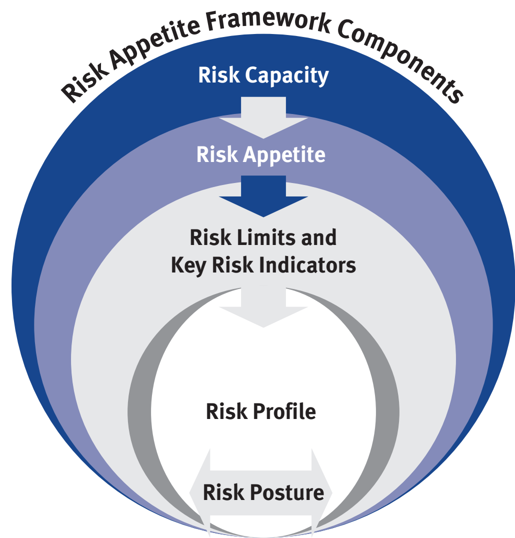
- Establishes risk management practices and provides risk guidance
- Provides oversight of the effectiveness of First Line risk management practices
- Monitors and independently reports on the level of risk against established risk appetite

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

Risk appetite

Effective risk management requires clear articulation of our risk appetite and how our risk profile will be managed in relation to that appetite. The ERAF articulates the amount and type of risk that we are able and willing to accept in the pursuit of our business objectives. The ERAF outlines the foundational aspects to 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 how to assess our risk posture, which enables our businesses to succinctly express the impact of strategic priorities and external factors on our risk profile. Effective implementation of the ERAF helps protect against unacceptable loss or an undesirable outcome with respect to earnings volatility, capital adequacy or liquidity, reputational risk, or other risks while supporting and enabling our overall business strategy.

Risk appetite is integrated into the periodic strategic, financial, and capital planning processes, as well as ongoing business decision-making processes, and is reviewed annually by senior management for recommendation to the Board for approval. Our risk appetite statements are structured in such a way that they can be applied at the enterprise, business segment, business unit and legal entity levels.



We are in the business of taking risks; however, we balance the risk-reward trade-off to ensure the long-term viability of the organization by remaining within our risk appetite. Our risk appetite is articulated in several complementary qualitative and quantitative risk appetite statements.

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 risks we understand. 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 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. • Always be operationally prepared and financially resilient for a potential crisis.

Our quantitative risk appetite statements are underpinned by risk appetite measures and their associated constraints that set boundaries for risk taking. Our qualitative risk appetite statements are aligned with the overarching Risk Management Principles and aim to articulate clear motivations for taking on or avoiding non-financial and less quantifiable risks.

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, judgmental risk measures are developed, and techniques such as stress testing, and scenario and sensitivity analyses can also be used 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 in:

- 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 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 or Board committee(s), 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 or Board committee(s) 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, geopolitical tensions, protectionism, additional rises in interest rates, and real estate price corrections, as well as credit spread and commodity shocks.

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 also 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 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

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.

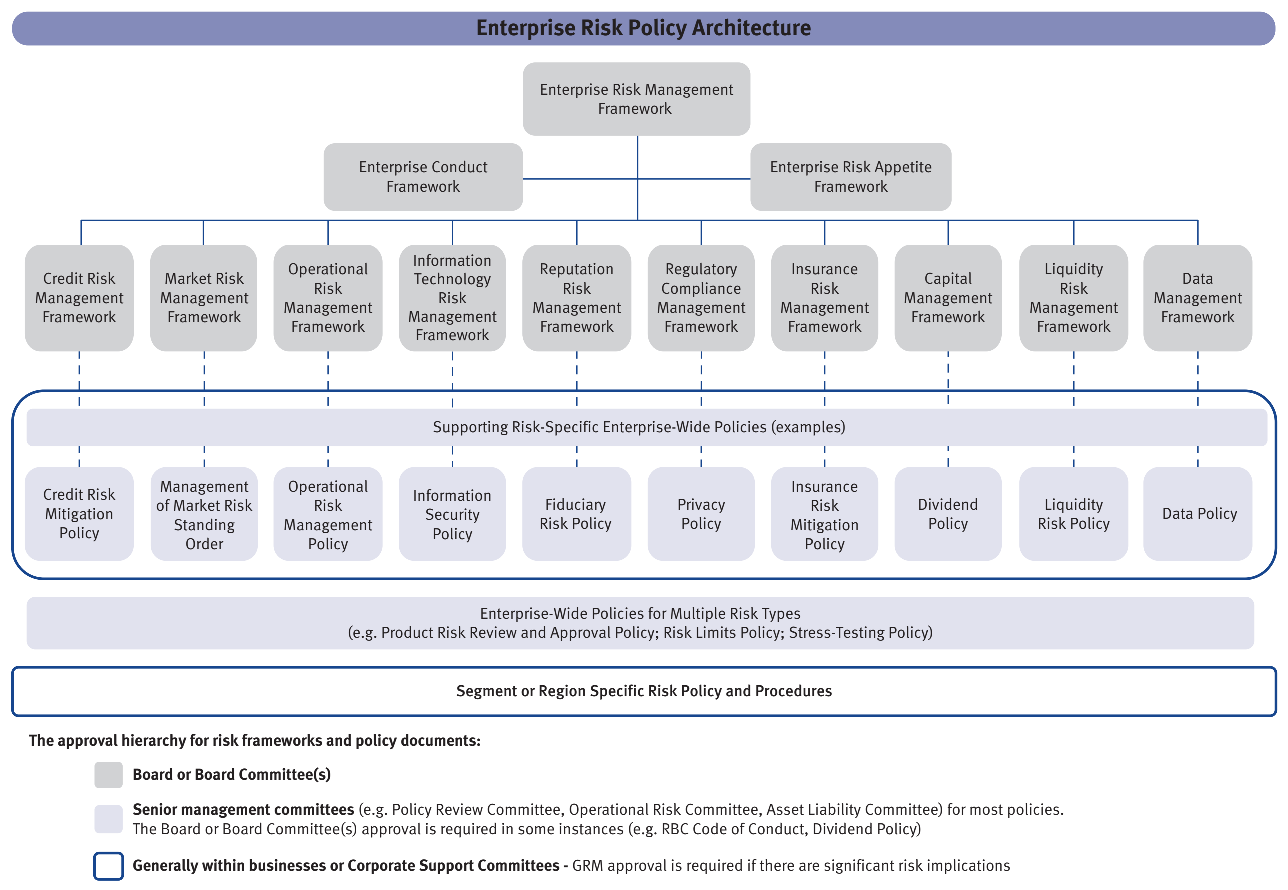
Model risk is the risk of adverse financial and/or reputational consequences to the enterprise arising from the use or misuse of models at any stage throughout a model's life cycle and is managed through our model risk governance and oversight structure. The governance and oversight structure, which 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 a model's life cycle.

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 conceptually 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 be applicable.

Risk control

Our enterprise-wide risk management approach is supported by a comprehensive set of risk controls.

These risk controls are defined in our Enterprise Risk Management and Risk-Specific Frameworks, which lay the foundation for the development and communication of policies, establishment of formal risk review and approval processes, and the establishment of delegated authorities and limits. The implementation of robust risk controls enables the optimization of risk and return on both a portfolio and a transactional basis.



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 based on the following categories: transactions, projects and initiatives, and new products and services.

Authorities and limits
The Board delegates credit, market, liquidity and insurance risk authorities to senior executives. In order to facilitate day-to-day business activities, these individuals can then delegate some or all of their authorities onwards. The delegated authorities allow these officers to approve single name, geographic (country and region) and industry sectors, and product and portfolio exposures within defined parameters and limits 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 and business segment 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 and trends. On an annual basis, we provide a benchmarking review 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 or Board Committee(s) on top and emerging risks or changes in our risk profile.

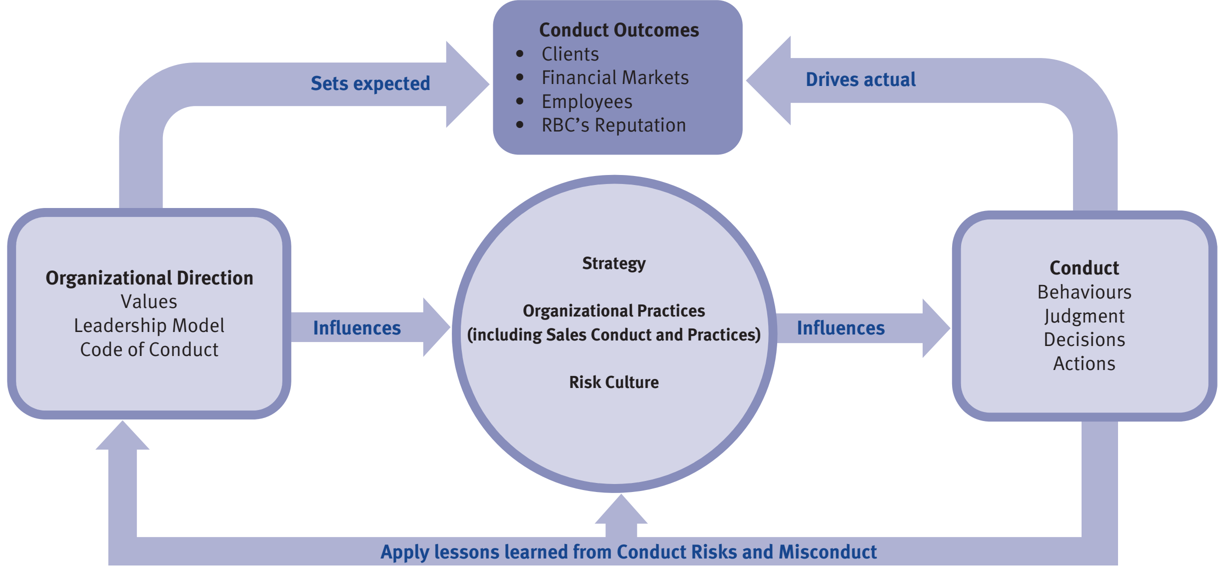
Risk conduct and culture
Our values set the tone of our organizational culture and translate into desired behaviours as articulated in our Code of Conduct and leadership model. Our Risk Management Principles provide a risk lens for these desired behaviours, enabling us to focus on a subset of behaviours and outcomes referred to as our Conduct. We define Conduct as the manifestation of culture through the behaviours, judgement, 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 Financial Stability Board's (FSB) 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 the risk functions. These behavioural expectations are supported by multiple online tools and resources, including our Code of Conduct, which are designed to help employees live our values, report misconduct and raise concerns, including those that might have ethical implications. The 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 2018 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. Credit risk 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 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, through its Risk Committee, 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. To facilitate day-to-day business operations, 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.

We maintain a Credit Risk Framework and supporting policies that are designed to clearly define roles and responsibilities, acceptable practices, limits and key controls. The Credit Risk Framework describes the principles, methodologies, systems, roles and responsibilities, reports and controls that exist for managing credit risk within the Bank.

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 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 regulatory and economic capital

In measuring credit risk to determine regulatory capital, two principal approaches are available: Internal Ratings Based (IRB) Approach and Standardized Approach. Most of our credit risk exposure is measured under the IRB.

Under the Standardized Approach, used primarily for our Caribbean banking operations and City National, risk weights prescribed by Office of the Superintendent of Financial Institutions (OSFI) are used to calculate risk-weighted assets (RWA) for credit risk exposure.

Economic capital, which is our internal quantification of risks, is used for performance measurement, limit setting and internal capital adequacy.

The key parameters that form the basis of our credit risk measures for both regulatory and economic capital are:

- 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, and are independently validated and updated on a regular basis.

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 security, and the industry sector in which the obligor operates. Estimated LGD rates draw primarily on internal loss experience. 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 9 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 9 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 9 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 9 LGDs are based on current conditions, adjusted for estimates of future conditions that will impact LGD under probability-weighted macroeconomic scenarios.

For further details on IFRS 9, refer to the Critical accounting policies and estimates section.

Gross credit risk exposure
Gross credit risk exposure is calculated based on the definitions provided under the Basel III framework. Under this method, EAD is calculated before taking into account any collateral and is inclusive of an estimate of potential future changes to that credit exposure. Gross credit risk is categorized into either lending-related and other, or trading-related.

Lending-related and other 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 (AFS under IAS 39) 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 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, defined by OSFI as the replacement cost plus an add-on amount for potential future credit exposure.

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 and on fundamental credit analysis. The determination of the PD associated with each BRR relies primarily on internal default history since the early 2000s. PD estimates are designed to be a conservative reflection of our experience across the economic cycle including periods of economic downturn.

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 ratings used by S&P and Moody's.

Internal ratings map* **Table 43**

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

* This table represents an integral part of our 2018 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 is measured not only by its current value, but also by how this value can move as market conditions change. Counterparty credit risk usually occurs in trading-related derivative and repo-style transactions. Derivative transactions include financial (e.g., forwards, futures, swaps and options) and non-financial (e.g., precious metal and commodities) derivatives. For further details on our derivative instruments and credit risk mitigation, refer to Note 8 of our 2018 Annual Consolidated Financial Statements.

Trading counterparty credit activities are undertaken in a manner consistent with the relevant requirements under the Credit Risk Management Framework and the Market Risk Management Framework, in line with our credit risk management policy documents, and with approval under 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 probability of default 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 probability of default of 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 term 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 44**

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 2018 Annual Consolidated Financial Statements.

Credit risk mitigation

Credit risk mitigation policies are an integral component of our Credit Risk Framework and set out the minimum requirements for the mitigation of credit risk.

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
We often require obligors to pledge collateral as security when we advance credit. 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 and its committees, the Group Executive (GE), the GRC and other senior management risk committees work together to ensure a Credit Risk Framework and supporting policies, processes and procedures exist to manage credit risk and approve related credit risk limits. Reports are distributed to the Board, the GRC, and senior executives to keep them informed of our risk profile, including trending information and significant credit risk issues and shifts in exposures to ensure appropriate 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 risks in our risk pyramid, including credit risk. All existing products must be reviewed following a risk-based assessment approach on a regular basis.

Credit risk limits
- Concentration risk is defined as the risk arising from large exposures to borrowers aggregated under one or more single names, industry sectors, countries or credit products within a portfolio 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.
- 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 risk concentration. Credit concentration limits are reviewed on a regular basis after taking into account business, economic, financial and regulatory environments.
- 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.

Credit risk administration
Effective November 1, 2017, we adopted IFRS 9, which introduced an expected loss accounting model for credit losses that differs significantly from the incurred loss model under IAS 39 and results in earlier recognition of credit losses. Under IAS 39, credit loss allowances were applied to loans, acceptances, and commitments. Under IFRS 9, credit loss allowances are applied to all financial assets except for those classified or designated as FVTPL and equity securities designated as FVOCI. A description of our expected credit loss impairment models is provided in the Critical accounting policies and estimates section for both IFRS 9 and IAS 39.

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.

Gross credit risk exposure by portfolio, sector and geography — Table 45

	As at											
	October 31 2018						October 31 2017*					
	Lending-related and other			Trading-related			Lending-related and other			Trading-related		
	Loans and acceptances						Loans and acceptances					
(Millions of Canadian dollars)	Outstanding (1)	Undrawn commitments (2)	Other (3)	Repo-style transactions	Derivatives (4)	Total exposure (5)	Outstanding (1)	Undrawn commitments (2)	Other (3)	Repo-style transactions	Derivatives (4)	Total exposure (5)
By portfolio												
Residential mortgages	$ 282,471	$ 759	$ 317	$ –	$ –	$ 283,547	$ 270,348	$ 818	$ 269	$ –	$ –	$ 271,435
Personal	92,700	103,583	201	–	–	196,484	92,294	88,120	176	–	–	180,590
Credit cards	19,415	26,524	–	–	–	45,939	18,035	21,826	–	–	–	39,861
Small business (6)	4,866	7,284	6	–	–	12,156	4,493	6,888	6	–	–	11,387
Retail	$ 399,452	$ 138,150	$ 524	$ –	$ –	$ 538,126	$ 385,170	$ 117,652	$ 451	$ –	$ –	$ 503,273
Business (6)												
Agriculture	$ 8,312	$ 1,762	$ 74	$ –	$ 45	$ 10,193	$ 7,380	$ 1,338	$ 78	$ –	$ 63	$ 8,859
Automotive	8,726	6,435	438	–	488	16,087	8,248	6,026	376	–	417	15,067
Consumer goods	12,012	10,046	669	–	481	23,208	11,387	8,872	605	–	525	21,389
Energy												
Oil & Gas	6,027	10,379	1,544	–	1,707	19,657	6,743	10,322	1,810	–	960	19,835
Utilities	8,090	17,309	3,318	–	2,394	31,111	5,614	14,867	3,689	37	1,347	25,554
Financing products	7,938	1,449	397	1,753	445	11,982	6,556	2,062	425	730	628	10,401
Forest products	1,100	933	90	–	23	2,146	911	635	85	–	16	1,647
Health services	6,982	5,612	2,910	–	415	15,919	6,998	4,602	1,800	1	522	13,923
Holding and investments	8,883	909	542	60	149	10,543	8,803	929	566	–	203	10,501
Industrial products	7,509	7,991	640	–	509	16,649	5,581	7,533	447	–	692	14,253
Mining & metals	1,301	3,758	984	–	120	6,163	1,113	3,816	1,027	–	101	6,057
Non-bank financial services	16,157	19,970	11,939	476,881	47,898	572,845	10,744	14,263	15,597	329,214	38,477	408,295
Other services	16,908	9,709	3,074	1,058	435	31,184	14,757	7,529	4,024	950	654	27,914
Real estate & related	51,563	13,073	1,917	2	499	67,054	46,197	11,267	1,603	3	443	59,513
Technology & media	11,506	17,132	1,332	409	3,500	33,879	8,890	14,129	633	305	2,456	26,413
Transportation & environment	6,318	6,220	2,191	–	1,066	15,795	5,950	5,712	3,300	–	841	15,803
Other sectors	5,551	383	1,905	–	632	8,471	4,570	17	4,694	3,018	563	12,862
Sovereign (6)	5,884	13,160	122,805	60,597	12,625	215,071	11,362	11,406	110,581	35,228	14,356	182,933
Bank (6)	5,173	2,710	136,142	117,340	24,065	285,430	4,261	1,423	132,644	106,346	23,735	268,409
Wholesale	$ 195,940	$ 148,940	$ 292,911	$ 658,100	$ 97,496	$ 1,393,387	$ 176,065	$ 126,748	$ 283,984	$ 475,832	$ 86,999	$ 1,149,628
Total exposure	$ 595,392	$ 287,090	$ 293,435	$ 658,100	$ 97,496	$ 1,931,513	$ 561,235	$ 244,400	$ 284,435	$ 475,832	$ 86,999	$ 1,652,901
By geography (7)												
Canada	$ 490,229	$ 188,170	$ 116,423	$ 86,800	$ 29,370	$ 910,992	$ 458,963	$ 156,249	$ 100,740	$ 68,279	$ 24,018	$ 808,249
U.S.	80,509	74,680	69,616	336,311	17,145	578,261	73,137	64,439	79,782	258,883	14,333	490,574
Europe	10,859	19,746	79,639	113,085	43,598	266,927	13,979	17,934	80,319	87,158	43,312	242,702
Other International	13,795	4,494	27,757	121,904	7,383	175,333	15,156	5,778	23,594	61,512	5,336	111,376
Total Exposure	$ 595,392	$ 287,090	$ 293,435	$ 658,100	$ 97,496	$ 1,931,513	$ 561,235	$ 244,400	$ 284,435	$ 475,832	$ 86,999	$ 1,652,901

* Results as at 2017 represent an integral part of our 2018 Annual Consolidated Financial Statements.
(1) Represents outstanding balances on loans and acceptances.
(2) Undrawn commitments represent an estimate of the contractual amount that may be drawn upon at the time of default of an obligor.
(3) Includes credit equivalent amounts for contingent liabilities such as letters of credit and guarantees, outstanding amounts for FVOCI debt securities (AFS debt securities under IAS 39), deposits with financial institutions and other assets.
(4) Credit equivalent amount after factoring in master netting agreements.
(5) Gross credit risk exposure is before allowance for loan losses. Exposures under Basel III asset classes of qualifying revolving retail and other retail are largely included within Personal and Credit cards, while home equity lines of credit are included in Personal.
(6) For further information, refer to Note 5 of our 2018 Annual Consolidated Financial Statements.
(7) Geographic profile is based on country of residence of the borrower.

2018 vs. 2017

Total gross credit risk exposure increased $279 billion or 17% from the prior year, mainly due to business growth in repo-style transactions and loans and acceptances, as well as the impact of foreign exchange translation.

Retail exposure increased by $35 billion or 7% largely due to business growth in undrawn commitments related to personal lending and credit cards, and business growth in residential mortgages.

Wholesale exposure increased by $244 billion or 21%, primarily attributable to business growth in repo-style transactions, driven by the Non-bank financial services sector and growth in loans and acceptances, as well as the impact of foreign exchange translation. Wholesale loan utilization was 38%, down from 39% last year.

The geographic mix of our gross credit risk exposure changed slightly from the prior year. Our exposure in Canada, the U.S., Europe and Other International was 47%, 30%, 14% and 9%, respectively (October 31, 2017 – 49%, 30%, 15% and 6%, respectively).

Our exposure in Canada increased $103 billion or 13% compared to prior year, primarily due to business growth in loans and acceptances and repo-style transactions.

Our exposure in the U.S. increased $88 billion or 18% compared to the prior year, mainly due to business growth in repo-style transactions and loans and acceptances, as well as the impact of foreign exchange translation.

Our exposure to Europe increased by $24 billion or 10%, largely due to business growth in repo-style transactions.

Our exposure to Other International increased by $64 billion or 57%, largely due to business growth in repo-style transactions.

Net European exposure by country and client type (1), (2)									**Table 46**
	October 31 2018								October 31 2017 (3)
	Asset type				Client type				
(Millions of Canadian dollars)	Loans Outstanding	Securities (4)	Repo-style transactions	Derivatives	Financials	Sovereign	Corporate	Total	Total
U.K.	$ 7,975	$ 10,393	$ 271	$ 1,439	$ 11,226	$ 1,644	$ 7,208	$ 20,078	$ 19,824
Germany	1,259	7,846	1	311	4,413	3,349	1,655	9,417	13,167
France	619	9,576	1	472	1,273	8,482	913	10,668	10,762
Total U.K., Germany, France	$ 9,853	$ 27,815	$ 273	$ 2,222	$ 16,912	$ 13,475	$ 9,776	$ 40,163	$ 43,753
Ireland	$ 728	$ 59	$ 125	$ 19	$ 158	$ 15	$ 758	$ 931	$ 623
Italy	534	114	–	29	98	14	565	677	319
Portugal	–	3	30	–	30	–	3	33	25
Spain	101	1,327	–	15	1,311	–	132	1,443	767
Total Peripheral (5)	$ 1,363	$ 1,503	$ 155	$ 63	$ 1,597	$ 29	$ 1,458	$ 3,084	$ 1,734
Luxembourg (6)	$ 1,460	$ 7,475	$ 18	$ 47	$ 888	$ 7,179	$ 933	$ 9,000	$ 6,596
Netherlands (6)	918	1,510	96	291	1,816	–	999	2,815	3,309
Norway	167	1,642	51	11	1,558	127	186	1,871	4,048
Sweden	298	3,975	25	10	2,555	1,525	228	4,308	4,240
Switzerland	510	6,008	116	201	993	5,566	276	6,835	3,548
Other	1,491	2,075	66	163	1,444	1,015	1,336	3,795	3,331
Total Other Europe	$ 4,844	$ 22,685	$ 372	$ 723	$ 9,254	$ 15,412	$ 3,958	$ 28,624	$ 25,072
Net exposure to Europe (7)	$ 16,060	$ 52,003	$ 800	$ 3,008	$ 27,763	$ 28,916	$ 15,192	$ 71,871	$ 70,559

(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 $111.1 billion against repo-style transactions (October 31, 2017 – $77.7 billion) and $11.6 billion against derivatives (October 31, 2017 – $12.6 billion).
(3) Amounts have been revised from those previously presented.
(4) Securities include $16.2 billion of trading securities (October 31, 2017 – $17.3 billion), $23.3 billion of deposits (October 31, 2017 – $19.7 billion), and $12.5 billion of debt securities carried at FVOCI (October 31, 2017 – $14.8 billion of AFS debt securities under IAS 39).
(5) Gross credit risk exposure to peripheral Europe is comprised of Ireland $26.8 billion (October 31, 2017 – $19.3 billion), Italy $0.9 billion (October 31, 2017 – $0.4 billion), Portugal $0.5 billion (October 31, 2017 – $nil), and Spain $0.8 billion (October 31, 2017 – $1.0 billion).
(6) Excludes $2.5 billion (October 31, 2017 – $1.8 billion) of exposures to supranational agencies.
(7) Reflects $1.2 billion of mitigation through credit default swaps, which are largely used to hedge single name exposures and market risk (October 31, 2017 – $1.4 billion).

2018 vs. 2017

Net credit risk exposure to Europe increased $1.3 billion from last year, primarily driven by increased exposure to Switzerland and Luxembourg, largely offset by a decrease in exposure to Germany and Norway. Our net exposure to peripheral Europe, which includes Ireland, Italy, Portugal and Spain, increased by $1.4 billion during the year to $3.1 billion.

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 for this portfolio decreased primarily due to lower provisions on an impaired loan that returned to performing status. The gross impaired loans ratio of this loan book was 10 bps, down from 100 bps last year mainly due to a loan returning to performing status.

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 47**

	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

	As at October 31, 2017						
	Residential mortgages						Home equity lines of credit
(Millions of Canadian dollars, except percentage amounts)	Insured (1)		Uninsured		Total		Total
Region (2)							
Canada							
Atlantic provinces	$ 7,670	57%	$ 5,848	43%	$ 13,518		$ 1,986
Quebec	15,089	48	16,557	52	31,646		3,964
Ontario	42,610	39	66,549	61	109,159		16,823
Alberta	21,820	58	15,702	42	37,522		6,950
Saskatchewan and Manitoba	9,305	54	7,932	46	17,237		2,627
B.C. and territories	17,169	37	29,521	63	46,690		8,620
Total Canada (3)	$ 113,663	44%	$ 142,109	56%	$ 255,772		$ 40,970
U.S. (4)	1	–	11,448	100	11,449		1,557
Other International (4)	9	–	3,091	100	3,100		1,992
Total International	$ 10	–%	$ 14,539	100%	$ 14,549		$ 3,549
Total	$ 113,673	42%	$ 156,648	58%	$ 270,321		$ 44,519

(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 $266 billion (2017 – $256 billion) is largely comprised of $243 billion (2017 – $231 billion) of residential mortgages and $7 billion (2017 – $6 billion) of mortgages with commercial clients, of which $4 billion (2017 – $4 billion) are insured mortgages, both in Canadian Banking, and $16 billion (2017 – $19 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, 2018, home equity lines of credit in Canadian Banking were $40 billion (2017 – $41 billion). Approximately 98% of these home equity lines of credit (2017 – 98%) are secured by a first lien on real estate, and only 7% (2017 – 7%) of the total homeline clients pay the scheduled interest payment only.

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 48**

	As at					
	October 31 2018			October 31 2017		
	Canada	**U.S. and Other International**	**Total**	Canada	U.S. and Other International	Total
Amortization period						
≤ 25 years	**70%**	**40%**	**68%**	73%	43%	71%
> 25 years ≤ 30 years	**23**	**60**	**25**	24	57	26
> 30 years ≤ 35 years	**5**	**–**	**5**	3	–	3
> 35 years	**2**	**–**	**2**	–	–	–
Total	**100%**	**100%**	**100%**	100%	100%	100%

Average loan-to-value (LTV) ratio for newly originated and acquired uninsured residential mortgages and homeline products
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 49**

	October 31 2018		October 31 2017	
	Uninsured		Uninsured	
	Residential mortgages (1)	**Homeline products** (2)	Residential mortgages (1)	Homeline products (2)
Region (3)				
Atlantic provinces	**73%**	**74%**	74%	74%
Quebec	**72**	**73**	72	73
Ontario	**70**	**67**	70	67
Alberta	**73**	**71**	73	72
Saskatchewan and Manitoba	**74**	**74**	74	74
B.C. and territories	**67**	**64**	69	65
U.S.	**71**	**n.m.**	73	n.m.
Other International	**60**	**n.m.**	62	n.m.
Average of newly originated and acquired for the period (4), (5)	**70%**	**68%**	70%	68%
Total Canadian Banking residential mortgages portfolio (6)	**55%**	**49%**	53%	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 and acceptances and commitments:

Provision for (recovery of) credit losses		Table 50
	IFRS 9	IAS 39
(Millions of Canadian dollars, except percentage amounts)	2018	2017
Personal & Commercial Banking	$ 1,245	$ 1,054
Wealth Management	(15)	34
Capital Markets	52	62
Corporate Support and Other	1	–
PCL – Loans	$ 1,283	$ 1,150
PCL – Other financial assets	24	
Total PCL	$ 1,307	$ 1,150
Retail	$ 116	
Wholesale	7	
PCL on performing loans (1)	$ 123	$ –
Retail	$ 1,011	$ 932
Wholesale	149	218
PCL on impaired loans (2)	$ 1,160	$ 1,150
PCL – Loans	$ 1,283	$ 1,150
PCL ratio – Loans (3)	0.23%	0.21%
PCL on impaired loans ratio (4)	0.20%	0.21%
Additional information by geography		
Canada (5)		
Residential mortgages	$ 44	$ 33
Personal	458	413
Credit cards	456	426
Small business	30	32
Retail	988	904
Wholesale	80	95
PCL on impaired loans (2)	$ 1,068	$ 999
U.S. (5)		
Retail	$ 4	$ 3
Wholesale	64	117
PCL on impaired loans (2)	$ 68	$ 120
Other International (5)		
Retail	$ 19	$ 25
Wholesale	5	6
PCL on impaired loans (2)	$ 24	$ 31
PCL on impaired loans (2)	$ 1,160	$ 1,150

(1) 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.
(2) Represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39.
(3) PCL ratio – Loans is calculated using PCL on Loans as a percentage of average net loans and acceptances.
(4) PCL on impaired loans ratio is calculated using PCL on impaired loans as a percentage of average net loans and acceptances. PCL on impaired loans represents Stage 3 PCL on loans, acceptances, and commitments under IFRS 9 and PCL on impaired loans under IAS 39.
(5) Geographic information is based on residence of borrower.

2018 vs. 2017
Total PCL was $1,307 million. PCL on loans of $1,283 million increased $133 million, or 12% from the prior year, mainly due to the adoption of IFRS 9 on November 1, 2017 as well as higher provisions in Personal & Commercial Banking. The PCL ratio on loans of 23 bps increased 2 bps.

PCL on performing loans of $123 million since the adoption of IFRS 9 was partially due to volume growth. Though our base economic outlook generally remained unchanged, we reflected elevated external risks to the macroeconomic outlook in our provisions which also contributed to the increase. These factors were partially offset by model and parameter updates.

PCL on impaired loans of $1,160 million increased $10 million, primarily due to higher provisions in Personal & Commercial Banking, largely offset by lower provisions in Wealth Management.

PCL on other financial assets of $24 million largely related to the restructuring of portfolios in Barbados.

PCL on loans in Personal & Commercial Banking increased $191 million, mainly due to the adoption of IFRS 9, which led to higher provisions on performing loans in the Canadian Personal Banking portfolios as described above, partially offset by lower provisions on performing loans in the Caribbean Banking portfolios due to model and parameter updates. Higher provisions on impaired loans in the Canadian Personal Banking portfolios also contributed to the increase.

PCL on loans in Wealth Management decreased $49 million, primarily due to lower provisions on impaired loans in U.S. Wealth Management (including City National) mainly due to loans returning to performing status.

PCL on loans in Capital Markets decreased $10 million, mainly reflecting lower provisions on performing loans.

Gross impaired loans (GIL) — **Table 51**

(Millions of Canadian dollars, except percentage amounts)	IFRS 9 2018	IAS 39 2017
Personal & Commercial Banking	$ 1,605	$ 1,500
Wealth Management (1)	203	549
Capital Markets	375	527
Investor & Treasury Services	–	–
Corporate Support and Other	–	–
Total GIL (1), (2)	$ 2,183	$ 2,576
Canada (3)		
Retail	$ 723	$ 559
Wholesale	396	426
GIL	1,119	985
U.S. (1), (3)		
Retail	$ 23	$ 59
Wholesale	401	736
GIL	424	795
Other International (3)		
Retail	$ 327	$ 345
Wholesale	313	451
GIL	640	796
Total GIL (1), (2)	$ 2,183	$ 2,576
Impaired loans, beginning balance	$ 2,576	$ 3,903
Classified as impaired during the period (new impaired) (4)	2,228	2,269
Net repayments (4)	(615)	(1,192)
Amounts written off	(1,444)	(1,425)
Other (1), (2), (4), (5)	(562)	(979)
Impaired loans, balance at end of period	$ 2,183	$ 2,576
GIL ratio (6)		
Total GIL ratio	0.37%	0.46%
Personal & Commercial Banking	0.37%	0.36%
Canadian Banking	0.26%	0.24%
Caribbean Banking	6.36%	6.33%
Wealth Management	0.34%	1.04%
Capital Markets	0.41%	0.63%

(1) Effective November 1, 2017, GIL excludes $229 million of ACI loans related to our acquisition of City National that have returned to performing status. As at October 31, 2018, $21 million of ACI loans that remain impaired are included in GIL. As at October 31, 2017, GIL includes $256 million related to the ACI loans portfolio from our acquisition of City National. ACI loans included in GIL added 5 bps to our October 31, 2017 GIL ratio. For further details, refer to Note 5 of our Annual Consolidated Financial Statements.

(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 resulting in an increase in GIL of $134 million.

(3) Geographic information is based on residence of borrower.

(4) 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 exchange and other movements amounts are not reasonably determinable.

(5) Includes return to performing status during the period, recoveries of loans and advances previously written off, sold, and exchange and other movements.

(6) GIL as a % of related loans and acceptances.

2018 vs. 2017

Total GIL of $2,183 million decreased $393 million or 15% from the prior year, and the total GIL ratio of 37 bps improved 9 bps, largely reflecting lower impaired loans in Wealth Management and Capital Markets, partially offset by higher impaired loans in Personal & Commercial Banking.

GIL in Personal & Commercial Banking increased $105 million, or 7%, primarily due to a change in the definition of impaired under IFRS 9 for certain products in our Canadian Personal Banking portfolios partially offset by lower impaired loans in our Canadian Business Banking portfolios.

GIL in Wealth Management decreased $346 million. This mainly reflects fewer impaired loans in U.S. Wealth Management (including City National) due to the exclusion of $229 million in ACI loans that have returned to performing status since our acquisition of City National and a change in the definition of impaired for certain products both effective November 1, 2017 and repayments during the year.

GIL in Capital Markets decreased $152 million or 29%, primarily due to repayments in the other services and oil & gas sectors.

Allowance for credit losses (ACL)		Table 52
	IFRS 9	IAS 39
(Millions of Canadian dollars)	2018	2017
Personal & Commercial Banking	$ 2,536	$ 497
Wealth Management	202	80
Capital Markets	347	160
Investor & Treasury Services	2	–
Corporate Support & Other (1)	1	1,513
ACL on loans	$ 3,088	$ 2,250
ACL on other financial assets	71	
Total ACL	$ 3,159	$ 2,250
ACL on loans is comprised of:		
ACL on performing loans (2)	$ 2,388	$ 1,513
ACL on impaired loans (3)	700	737
ACL on loans		
Retail	$ 1,753	
Wholesale	635	
ACL on performing loans (2)	$ 2,388	$ 1,513
Canada (4)		
Retail	$ 168	$ 141
Wholesale	92	124
ACL on impaired loans (3)	$ 260	$ 265
U.S. (4)		
Retail	$ 1	$ 1
Wholesale	164	150
ACL on impaired loans (3)	$ 165	$ 151
Other International (4)		
Retail	$ 166	$ 168
Wholesale	109	153
ACL on impaired loans (3)	$ 275	$ 321
ACL on impaired loans (3)	$ 700	$ 737

(1) Prior period amounts in Corporate Support & Other are primarily comprised of Allowance for loans not yet identified as impaired. Under IFRS 9, Stage 1 and Stage 2 ACL are recorded within the respective business segment. For further information, refer to the How we measure and report our business segments section.
(2) 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.
(3) Represents Stage 3 ACL on loans, acceptances, and commitments under IFRS 9 and Allowance for impaired loans under IAS 39.
(4) Geographic information is based on residence of borrower.

2018 vs. 2017

Total ACL of $3,159 million increased $909 million from the prior year, reflecting an increase of $838 million in ACL on loans and the inclusion of $71 million in ACL on other financial assets primarily due to the adoption of IFRS 9.

ACL on performing loans of $2,388 million was $875 million higher than the Allowance for loans not yet identified as impaired of $1,513 million in the prior year. The increase was largely due to the adoption of IFRS 9 and volume growth, and primarily reflects higher ACL on loans in Personal & Commercial Banking.

ACL on impaired loans of $700 million decreased $37 million from the prior year, mainly due to lower ACL on loans in Wealth Management.

Market risk

Market risk is defined to be the impact of market prices upon our financial condition. This includes potential gains or losses due to changes in market determined variables such as interest rates, credit spreads, equity prices, commodity prices, foreign exchange rates and implied volatilities.

The measures of financial condition impacted by market risk are as follows:

1. Positions whose revaluation gains and losses are reported in Revenue, which includes:
   a) Changes in the fair value of instruments classified or designated as 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) Remeasurements of employee benefit plans; this includes pension fund assets underperforming in the market resulting in a deficit and volatility between the pension liabilities and the fund assets, and/or estimated actuarial parameters not being realized such that pension liabilities exceed pension fund assets.
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 value of other non-trading positions whose value is a function of 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 2018 and 2017.

Market Risk VaR* **Table 53**

	October 31, 2018				October 31, 2017			
		For the year ended				For the year ended		
(Millions of Canadian dollars)	As at	Average	High	Low	As at	Average	High	Low
Equity	$ 34	$ 14	$ 40	$ 6	$ 10	$ 12	$ 26	$ 6
Foreign exchange	12	4	12	2	3	4	6	3
Commodities	2	2	3	1	3	3	6	2
Interest rate (1)	15	17	30	10	16	17	25	13
Credit specific (2)	5	5	6	4	4	4	5	4
Diversification (3)	(29)	(17)	n.m.	n.m.	(18)	(18)	n.m.	n.m.
Market risk VaR	$ 39	$ 25	$ 44	$ 13	$ 18	$ 22	$ 35	$ 15
Market risk Stressed VaR	$ 91	$ 79	$ 149	$ 40	$ 43	$ 53	$ 95	$ 34

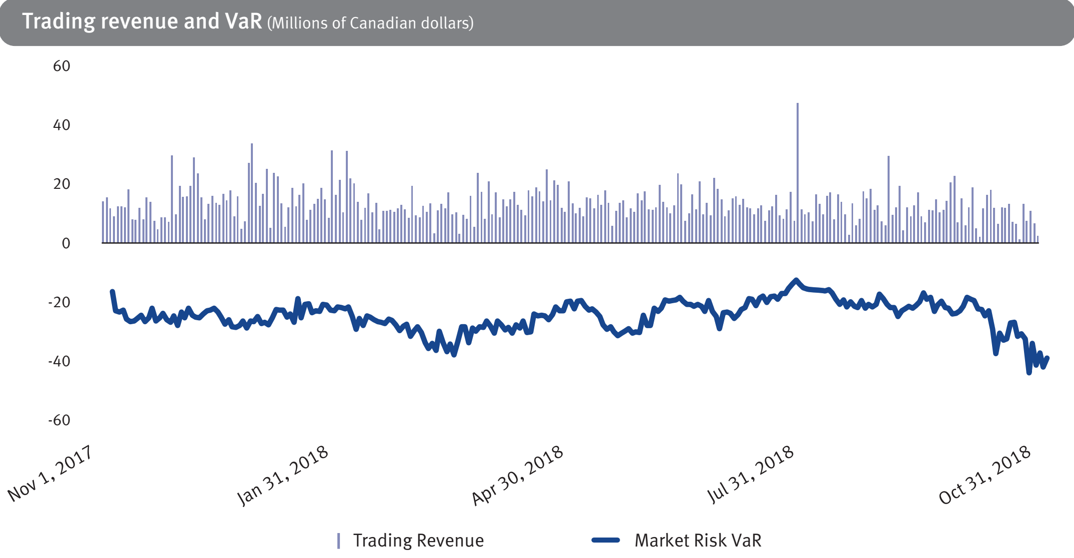
* This table represents an integral part of our 2018 Annual Consolidated Financial Statements.
(1) General credit spread risk and funding spread risk associated with uncollateralized derivatives are included under interest rate VaR.
(2) Credit specific risk captures issuer-specific credit spread volatility.
(3) Market risk VaR is less than the sum of the individual risk factor VaR results due to portfolio diversification.
n.m. not meaningful

2018 vs. 2017

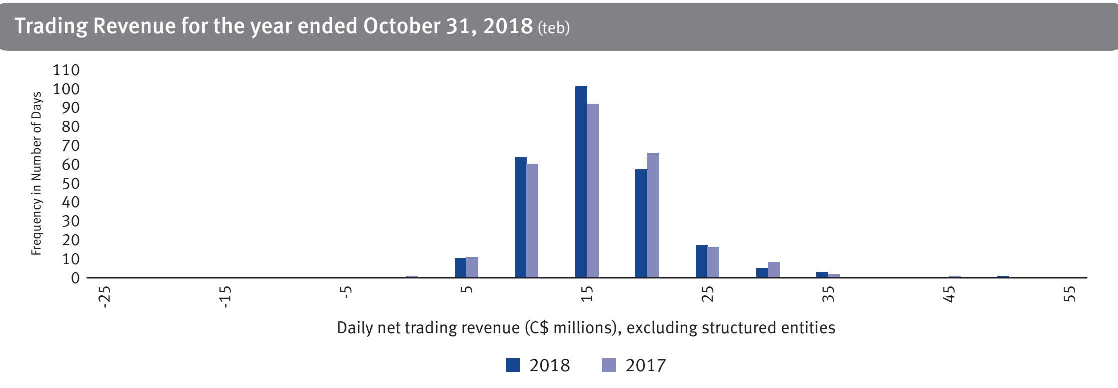
Average market risk VaR of $25 million increased $3 million from the prior year, largely due to the change in classification of certain portfolios from AFS to FVTPL as a result of adopting IFRS 9. Client-driven activity in volatile equity derivative markets also contributed to larger volatility in this metric during the year.

Average SVaR of $79 million increased $26 million from the prior year, largely driven by the adoption of IFRS 9 as mentioned above, and the impact of foreign exchange translation. Expiries and repurchases of certain hedging instruments in our equity derivatives trading portfolio also contributed to volatility in this metric during the year.

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 no net losses in 2018 compared to 1 day of losses totaling $2 million in 2017, which did not exceed VaR on that day.



The following chart displays the distribution of daily trading profit and loss in 2018 and 2017. There were no daily reported losses in 2018. The largest reported profit was $47 million with an average daily profit of $13 million.



Market risk measures for other FVTPL positions – 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, 2018, we had liabilities with respect to insurance obligations of $10.0 billion, up from $9.7 billion in the prior year, and assets of $8.1 billion in support of the liabilities, up from $7.7 billion last year.

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 Group Risk Committee, the Risk Committee of the Board and the Board.

Details on the non-trading risks included in SIRR are outlined in Table 55.

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.

Market risk – SIRR measures* **Table 54**

	2018						2017	
	EVE risk			NII risk (1)				
(Millions of Canadian dollars)	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:								
100bps increase in rates	$ (1,103)	$ (37)	$ (1,140)	$ 330	$ 175	$ 505	$ (1,215)	$ 451
100bps decrease in rates	1,023	(268)	755	(398)	(184)	(582)	638	(604)
Before-tax impact of:								
200bps increase in rates	(2,217)	(190)	(2,407)	579	344	923	(2,507)	825
200bps decrease in rates	2,046	(979)	1,067	(952)	(418)	(1,370)	1,003	(1,007)

* This table represents an integral part of our 2018 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, 2018, an immediate and sustained -100 bps shock would have had a negative impact to our NII of $582 million, down from $604 million last year. An immediate and sustained +100 bps shock at the end of October 31, 2018 would have had a negative impact to our EVE of $1,140 million, down from $1,215 million reported last year. The year-over-year NII sensitivity to rate increases was higher in response to balance sheet positioning and growth. During 2018, NII and EVE risks remained well within approved limits.

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

Market risk measures for other material non-trading portfolios

Investment securities carried at FVOCI

We held $48.5 billion of investment securities carried at FVOCI as at October 31, 2018. At October 31, 2017, we held $75.9 billion of AFS securities. The year-over-year decrease was largely driven by the change in classification of certain portfolios as a result of adopting IFRS 9 on November 1, 2017. 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, 2018, 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 $19 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, 2018 was $7.1 billion. Our investment securities carried at FVOCI also include equity exposures of $0.4 billion as at October 31, 2018. As at October 31, 2017, our AFS securities included equity exposures of $1.2 billion.

Derivatives related to non-trading activity

Derivatives are also used to hedge market risk exposures unrelated to our trading activity. In aggregate, derivative assets not related to trading activity of $2.8 billion as at October 31, 2018 were down from $3.2 billion last year, and derivative liabilities of $2.9 billion as at October 31, 2018 were down from $3.2 billion last year.

Non-trading derivatives in hedge accounting relationships

The derivative assets and liabilities described above include derivative assets in a designated hedge accounting relationship of $1.5 billion as at October 31, 2018, up from $1.3 billion as at October 31, 2017, and derivative liabilities of $2.1 billion as at October 31, 2018, up from $1.5 billion last year. These derivative assets and liabilities 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. To the extent these swaps are considered effective, changes in their fair value are recognized in OCI. The interest rate risk for the swaps designated as cash flow hedges, measured as the change in the fair value of the derivatives for a one basis point parallel increase in yields, was $7 million as of October 31, 2018 compared to $8 million as of October 31, 2017.

Interest rate swaps are also used to hedge changes in the fair value of certain fixed-rate instruments. Changes in fair value of the hedged instruments that are related to interest rate movements and the corresponding interest rate swaps are reflected in the Consolidated Statements of Income.

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. Changes in the fair value of these hedges and the cumulative translation adjustment related to our structural foreign exchange risk are reported in OCI.

Other non-trading derivatives

Derivatives, including interest rate swaps and foreign exchange derivatives, that are not in designated hedge accounting relationships are used to manage other non-trading exposures. Changes in the fair value of these derivatives are reflected in the Consolidated Statements of Income. Derivative assets of $1.3 billion as at October 31, 2018 were down from $1.9 billion as at October 31, 2017, and derivative liabilities of $0.8 billion as at October 31, 2018 were down from $1.7 billion last 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.

Linkage of market risk to selected balance sheet items

The following table provides 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 55**

	As at October 31, 2018			
		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 (3)	$ 30,209	$ –	$ 30,209	Interest rate
Interest-bearing deposits with banks (4)	36,471	20,277	16,194	Interest rate
Securities				
Trading (5)	128,258	120,163	8,095	Interest rate, credit spread
Investment, net of applicable allowance (6)	94,608	–	94,608	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed (7)	294,602	219,108	75,494	Interest rate
Loans				
Retail (8)	399,452	4,307	395,145	Interest rate
Wholesale (9)	180,278	9,128	171,150	Interest rate
Allowance for loan losses	(2,912)	–	(2,912)	Interest rate
Segregated fund net assets (10)	1,368	–	1,368	Interest rate
Derivatives	94,039	91,275	2,764	Interest rate, foreign exchange
Other assets (11)	71,655	2,259	69,396	Interest rate
Assets not subject to market risk (12)	6,706			
Total assets	$ 1,334,734	$ 466,517	$ 861,511	
Liabilities subject to market risk				
Deposits (13)	$ 837,046	$ 82,281	$ 754,765	Interest rate
Segregated fund liabilities (14)	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 (15)	206,814	201,839	4,975	Interest rate
Derivatives	90,238	87,352	2,886	Interest rate, foreign exchange
Other liabilities (16)	72,116	7,661	64,455	Interest rate
Subordinated debentures	9,131	–	9,131	Interest rate
Liabilities not subject to market risk (17)	5,819			
Total liabilities	$ 1,254,779	$ 411,380	$ 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.

The following footnotes provide additional information on the Non-traded risk amounts:

(3) Cash and due from banks includes $14,278 million included in SIRR. An additional $15,931 million is included in other risk controls.
(4) Interest-bearing deposits with banks of $16,194 million are included in SIRR.
(5) Trading securities include $8,095 million in securities for asset/liability management of RBC Insurance.
(6) Includes investment securities carried at FVOCI of $48,499 million and investment securities, net of applicable allowance, carried at amortized cost of $46,109 million. $53,190 million of the total securities are included in SIRR. An additional $2,070 million are held by RBC Insurance. The remaining $39,348 million are captured in other internal non-trading market risk reporting.
(7) Assets purchased under reverse repurchase agreements include $33,335 million reflected in SIRR. An additional $42,159 million is included in other risk controls.
(8) Retail loans include $382,300 million reflected in SIRR and $285 million is used for asset/liability management of RBC Insurance. An additional $12,560 million is included in other risk controls.
(9) Wholesale loans include $169,152 million reflected in SIRR. An additional $1,998 million is used for asset/liability management of RBC Insurance.
(10) Investments for the account of segregated fund holders are included in RBC Insurance risk measures.
(11) Other assets include $43,428 million reflected in SIRR and $2,372 million is used for asset/liability management of RBC Insurance. An additional $23,596 million is included in other risk controls.
(12) Assets not subject to market risk include $6,706 million of physical and other assets.
(13) Deposits include $673,249 million reflected in SIRR. The remaining $81,516 million are captured in other internal non-trading market risk reporting.
(14) Insurance and investment contracts for the account of segregated fund holders are included in RBC Insurance risk measures.
(15) Obligations related to assets sold under repurchase agreements and securities loaned include $4,975 million in other risk controls.
(16) Other liabilities include $42,604 million reflected in SIRR and $10,669 million of RBC Insurance liabilities. An additional $11,182 million is included in other risk controls.
(17) Liabilities not subject to market risk include $5,819 million of payroll related and other liabilities.

(Millions of Canadian dollars)	As at October 31, 2017			
		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 (3)	$ 28,407	$ –	$ 28,407	Interest rate
Interest-bearing deposits with banks (4)	32,662	20,792	11,870	Interest rate
Securities				
Trading (5)	127,657	119,815	7,842	Interest rate, credit spread
Investment, net of applicable allowance (6)	90,722	–	90,722	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed (7)	220,977	141,532	79,445	Interest rate
Loans				
Retail (8)	385,170	7,638	377,532	Interest rate
Wholesale (9)	159,606	4,217	155,389	Interest rate
Allowance for loan losses	(2,159)	–	(2,159)	Interest rate
Segregated fund net assets (10)	1,216	–	1,216	Interest rate
Derivatives	95,023	91,791	3,232	Interest rate, foreign exchange
Other assets (11)	68,545	2,006	66,539	Interest rate
Assets not subject to market risk (12)	5,027			
Total assets	$ 1,212,853	$ 387,791	$ 820,035	
Liabilities subject to market risk				
Deposits (13)	$ 789,635	$ 78,194	$ 711,441	Interest rate
Segregated fund liabilities (14)	1,216	–	1,216	Interest rate
Other				
Obligations related to securities sold short	30,008	30,008	–	
Obligations related to assets sold under repurchase agreements and securities loaned (15)	143,084	136,371	6,713	Interest rate
Derivatives	92,127	88,919	3,208	Interest rate, foreign exchange
Other liabilities (16)	65,565	4,275	61,290	Interest rate
Subordinated debentures	9,265	–	9,265	Interest rate
Liabilities not subject to market risk (17)	7,525			
Total liabilities	$ 1,138,425	$ 337,767	$ 793,133	
Total equity	$ 74,428			
Total liabilities and equity	$ 1,212,853			

(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 AFS securities not included in SIRR.
The following footnotes provide additional information on the Non-traded risk amounts:
(3) Cash and due from banks includes $15,895 million included in SIRR. An additional $12,512 million is included in other risk controls.
(4) Interest-bearing deposits with banks of $11,870 million are included in SIRR.
(5) Trading securities include $7,706 million in securities for asset/liability management of RBC Insurance. An additional $136 million is included in other risk controls.
(6) Includes AFS securities of $75,877 million and held-to-maturity securities of $14,845 million. $51,269 million of the total securities are included in SIRR. An additional $1,946 million are held by RBC Insurance. The remaining $37,507 million are captured in other internal non-trading market risk reporting.
(7) Assets purchased under reverse repurchase agreements include $32,541 million reflected in SIRR. An additional $46,904 million is included in other risk controls.
(8) Retail loans include $366,928 million reflected in SIRR and $241 million is used for asset/liability management of RBC Insurance. An additional $10,363 million is included in other risk controls.
(9) Wholesale loans include $153,829 million reflected in SIRR. An additional $1,560 million is used for asset/liability management of RBC Insurance.
(10) Investments for the account of segregated fund holders are included in RBC Insurance risk measures.
(11) Other assets include $37,999 million reflected in SIRR and $2,428 million is used for asset/liability management of RBC Insurance. An additional $26,112 million is included in other risk controls.
(12) Assets not subject to market risk include $5,027 million of physical and other assets.
(13) Deposits include $650,841 million reflected in SIRR. The remaining $60,600 million are captured in other internal non-trading market risk reporting.
(14) Insurance and investment contracts for the account of segregated fund holders are included in RBC Insurance risk measures.
(15) Obligations related to assets sold under repurchase agreements and securities loaned include $6,713 million in other risk controls.
(16) Other liabilities include $36,019 million reflected in SIRR and $10,318 million of RBC Insurance liabilities. An additional $14,953 million is included in other risk controls.
(17) Liabilities not subject to market risk include $7,525 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 capacities 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 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 and status. 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 demand 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 accepted 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 local 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, and 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, for the most part, a ready source of funding that can be accessed quickly. 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 local 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. Unencumbered assets, in turn, are the difference between total and encumbered assets from both on- and off-balance sheet sources.

Liquidity reserve

In the liquidity reserve table, available liquid assets consist of on-balance sheet cash and securities holdings, as well as securities received as collateral from securities financing (reverse repos and off-balance sheet collateral swaps) and derivative transactions, and constitute a potential quick source of liquidity. The other component of our liquidity reserve consists primarily of uncommitted and undrawn central bank credit facilities that could be accessed under exceptional circumstances, provided certain pre-conditions could be met and where advances could be supported by eligible assets (e.g., certain unencumbered loans) not included in the liquid assets category.

The liquidity reserve is affected primarily by changes in client banking activity (e.g., liquid asset holdings may change to reflect changes in client deposit balances), capital markets activities and strategies, and the timing between debt issuances and deployment of funding.

Liquidity reserve **Table 56**

	As at October 31, 2018				
(Millions of Canadian dollars)	Bank-owned liquid assets	Securities received as collateral from securities financing 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 October 31, 2017				
(Millions of Canadian dollars) (5)	Bank-owned liquid assets	Securities received as collateral from securities financing derivative transactions	Total liquid assets	Encumbered liquid assets	Unencumbered liquid assets
Cash and due from banks	$ 28,407	$ –	$ 28,407	$ 3,044	$ 25,363
Interest-bearing deposits with banks	32,662	–	32,662	409	32,253
Securities issued or guaranteed by sovereigns, central banks or multilateral development banks (1)	181,351	167,966	349,317	209,528	139,789
Other securities	76,464	110,300	186,764	57,746	129,018
Undrawn credit lines granted by central banks (2)	12,007	–	12,007	–	12,007
Other assets eligible as collateral for discount (3)	94,207	–	94,207	–	94,207
Other liquid assets (4)	20,606	–	20,606	19,524	1,082
Total liquid assets	$ 445,704	$ 278,266	$ 723,970	$ 290,251	$ 433,719

	As at	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017 (5)
Royal Bank of Canada	**$ 219,197**	$ 232,674
Foreign branches	**73,015**	65,237
Subsidiaries	**153,048**	135,808
Total unencumbered liquid assets	**$ 445,260**	$ 433,719

(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 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. It also includes our unencumbered mortgage loans that qualify as eligible collateral at Federal Home Loan Bank (FHLB). ELA and FHLB are not considered sources 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.
(4) Encumbered liquid assets amount represents cash collateral and margin deposit amounts pledged related to OTC and exchange-traded derivative transactions.
(5) Amounts have been revised from those previously presented.

2018 vs. 2017
Total liquid assets increased $126 billion or 17%, primarily due to a significant increase in securities received as collateral under reverse repurchase agreements and collateral swap transactions. The increase in collateral received however, was offset with a corresponding increase in collateral pledged under encumbered liquid assets due to repurchase transactions and collateral swaps.

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, 2018, our Unencumbered assets available as collateral comprised 29% of total assets (October 31, 2017 – 32%).

Asset encumbrance **Table 57**

	As at									
	October 31 2018					October 31 2017(1)				
	Encumbered		Unencumbered			Encumbered		Unencumbered		
(Millions of Canadian dollars)	Pledged as collateral	Other (2)	Available as collateral (3)	Other (4)	Total	Pledged as collateral	Other (2)	Available as collateral (3)	Other (4)	Total
Cash and due from banks	$ –	$ 2,573	$ 27,636	$ –	$ 30,209	$ –	$ 3,044	$ 25,363	$ –	$ 28,407
Interest-bearing deposits with banks	–	366	36,105	–	36,471	–	409	32,253	–	32,662
Securities										
Trading	40,640	–	84,270	3,348	128,258	36,844	–	86,781	4,032	127,657
Investment, net of applicable allowance	12,195	–	82,351	62	94,608	10,018	–	80,704	–	90,722
Assets purchased under reverse repurchase agreements and securities borrowed (5)	348,597	22,188	53,590	5,722	430,097	232,125	23,131	56,820	6,570	318,646
Loans										
Retail										
Mortgage securities	34,286	–	36,234	–	70,520	35,883	–	34,542	–	70,425
Mortgage loans	36,959	–	17,784	157,208	211,951	37,041	–	14,737	148,145	199,923
Non-mortgage loans	8,553	–	59,611	48,817	116,981	7,543	–	60,959	46,320	114,822
Wholesale	–	–	32,478	147,800	180,278	–	–	30,518	129,087	159,605
Allowance for loan losses	–	–	–	(2,912)	(2,912)	–	–	–	(2,158)	(2,158)
Segregated fund net assets	–	–	–	1,368	1,368	–	–	–	1,216	1,216
Other – Derivatives	–	–	–	94,039	94,039	–	–	–	95,023	95,023
– Others (6)	19,406	–	352	58,603	78,361	19,524	–	1,082	52,967	73,573
Total assets	$ 500,636	$ 25,127	$ 430,411	$ 514,055	$ 1,470,229	$ 378,978	$ 26,584	$ 423,759	$ 481,202	$ 1,310,523

(1) Amounts have been revised from those previously presented.
(2) Includes assets restricted from use to generate secured funding due to legal or other constraints.
(3) 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, FHLB, 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.
(4) 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.
(5) Includes bank-owned liquid assets and securities received as collateral from off-balance sheet securities financing, derivative transactions, and margin lending. Includes $22.2 billion (October 31, 2017 – $23.1 billion) of collateral received through reverse repurchase transactions that cannot be rehypothecated in its current legal form.
(6) 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, 2018, relationship-based deposits, which are the primary source of funding for retail loans and mortgages, were $545 billion or 50% of our total funding (October 31, 2017 – $525 billion or 54%). 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.

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

Long-term debt issuance
During 2018, we continued to experience more favourable unsecured wholesale funding access and pricing relative to many global peers. We also continued to expand our unsecured long-term funding base by selectively issuing, either directly or through our subsidiaries, $36.0 billion of term funding in various currencies and markets. Total unsecured long-term funding outstanding increased $6.2 billion from the prior year due to higher issuances, partially 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 2017, our outstanding MBS sold, covered bonds, and securitized credit card receivables remained relatively unchanged. For further details, refer to the Off-balance sheet arrangements section.

Long-term funding sources* **Table 58**

(Millions of Canadian dollars)	As at October 31 2018	October 31 2017
Unsecured long-term funding	$ 102,325	$ 96,112
Secured long-term funding	64,843	64,758
Commercial mortgage-backed securities sold	1,535	1,366
Subordinated debentures	9,397	9,362
	$ 178,100	$ 171,598

* This table represents an integral part of our 2018 Annual Consolidated Financial Statements.

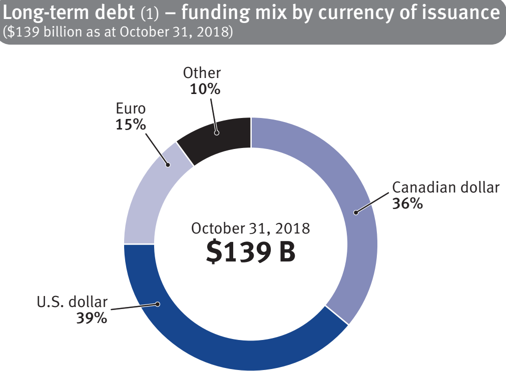
Our wholesale funding activities are well-diversified by geography, investor segment, instrument, currency, structure and maturity. We maintain an ongoing presence in different funding markets which allows us to continuously monitor market developments and trends, identify opportunities and risks, and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

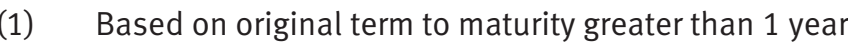
Programs by geography **Table 59**

Canada	U.S.	Europe/Asia
• Canadian Shelf Program – $25 billion	• SEC 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 Deposit 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.

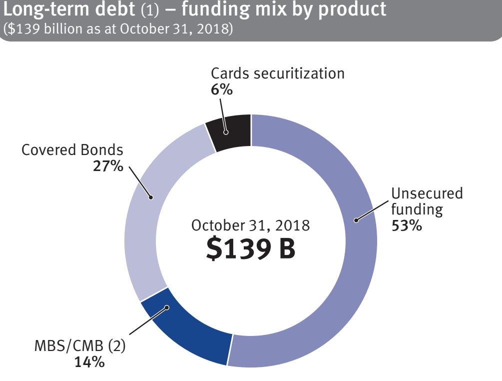
Long-term debt (1) – funding mix by currency of issuance
($139 billion as at October 31, 2018)





(1) Based on original term to maturity greater than 1 year

Long-term debt (1) – funding mix by product
($139 billion as at October 31, 2018)



(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 60**

	As at October 31, 2018							
(Millions of Canadian dollars)	Less than 1 month	1 to 3 months	3 to 6 months	6 to 12 months	Less than 1 year sub-total	1 year to 2 years	2 years and greater	Total
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

	As at October 31, 2017							
(Millions of Canadian dollars)	Less than 1 month	1 to 3 months	3 to 6 months	6 to 12 months	Less than 1 year sub-total	1 year to 2 years	2 years and greater	Total
Deposits from banks (2)	$ 5,054	$ 39	$ 47	$ 13	$ 5,153	$ –	$ –	$ 5,153
Certificates of deposit and commercial paper	1,092	8,801	14,194	13,501	37,588	1,549	39	39,176
Asset-backed commercial paper (3)	997	1,385	4,300	5,555	12,237	–	–	12,237
Senior unsecured medium-term notes (4)	–	2,625	3,402	16,691	22,718	17,311	38,695	78,724
Senior unsecured structured notes (5)	188	192	980	1,545	2,905	1,332	6,270	10,507
Mortgage securitization	–	571	1,310	1,549	3,430	4,094	12,650	20,174
Covered bonds/asset-backed securities (6)	–	2,685	1,777	6,179	10,641	10,017	23,925	44,583
Subordinated liabilities	–	–	–	–	–	1,106	8,256	9,362
Other (7)	4,669	2,005	173	1,488	8,335	5	5,344	13,684
Total	$ 12,000	$ 18,303	$ 26,183	$ 46,521	$ 103,007	$ 35,414	$ 95,179	$ 233,600
Of which:								
– Secured	$ 5,265	$ 5,541	$ 7,388	$ 13,283	$ 31,477	$ 14,111	$ 36,575	$ 82,163
– Unsecured	6,735	12,762	18,795	33,238	71,530	21,303	58,604	151,437

(1) Excludes bankers' acceptances and repos.
(2) Excludes deposits associated with services we provide to banks (e.g., custody, cash management).
(3) Only includes consolidated liabilities, including our collateralized commercial paper program.
(4) Includes deposit notes.
(5) Includes notes where the payout is tied to movements in foreign exchange, commodities and equities.
(6) Includes credit card and mortgage loans.
(7) Includes tender option bonds (secured) of $6,978 million (October 31, 2017 – $5,168 million), bearer deposit notes (unsecured) of $4,084 million (October 31, 2017 – $3,342 million) and other long-term structured deposits (unsecured) of $8,969 million (October 31, 2017 – $5,176 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 61**

	As at November 27, 2018			
	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	AA (low)	positive

(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 Canadian Bank Recapitalization (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 July 16, 2018, Moody's upgraded our legacy senior long-term debt rating two notches and revised our outlook to stable from negative. On July 16, 2018, Moody's also announced our rating for senior long-term debt of A2.
(5) On June 27, 2018, S&P revised our outlook to stable from negative. On August 16, 2018, S&P announced our rating for senior long-term debt of A.
(6) On June 21, 2018, Fitch Ratings announced that our rating for senior long-term debt will be the same as our legacy senior long-term debt, as they did not expect any immediate rating changes as a result of the Bail-in regime. On October 22, 2018, Fitch Ratings affirmed our ratings with a stable outlook.
(7) On June 26, 2018, DBRS revised our outlook to positive from stable. On April 19, 2018, DBRS announced our rating for senior long-term debt of 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 62**

	As at					
	October 31 2018			October 31 2017		
(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	$ 125	$ 45	$ 191	$ 61	$ 102	$ 307
Other contractual funding or margin requirements (1)	185	176	–	231	100	–

(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 Basel Committee on Banking Supervision (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 63**

(Millions of Canadian dollars, except percentage amounts)	For the three months ended			
	October 31 2018		July 31 2018	
	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)		**212,818**		219,719
Cash outflows				
Retail deposits and deposits from small business customers, of which:	**252,514**	**19,398**	252,338	19,458
Stable deposits (3)	**83,611**	**2,508**	82,520	2,476
Less stable deposits	**168,903**	**16,890**	169,818	16,982
Unsecured wholesale funding, of which:	**285,140**	**129,249**	282,184	127,647
Operational deposits (all counterparties) and deposits in networks of cooperative banks (4)	**126,889**	**30,276**	127,159	30,351
Non-operational deposits	**136,572**	**77,294**	130,873	73,144
Unsecured debt	**21,679**	**21,679**	24,152	24,152
Secured wholesale funding		**29,837**		24,595
Additional requirements, of which:	**260,417**	**79,668**	257,140	80,032
Outflows related to derivative exposures and other collateral requirements	**61,154**	**42,867**	63,454	43,804
Outflows related to loss of funding on debt products	**6,232**	**6,232**	5,708	5,708
Credit and liquidity facilities	**193,031**	**30,569**	187,978	30,520
Other contractual funding obligations (5)	**26,811**	**26,811**	43,563	43,563
Other contingent funding obligations (6)	**420,344**	**7,557**	427,781	7,369
Total cash outflows		**292,520**		302,664
Cash inflows				
Secured lending (e.g., reverse repos)	**233,784**	**49,183**	218,333	44,388
Inflows from fully performing exposures	**14,345**	**10,156**	15,153	10,646
Other cash inflows	**59,683**	**59,683**	64,995	64,995
Total cash inflows		**119,022**		120,029
		Total adjusted value		Total adjusted value
Total HQLA		**212,818**		219,719
Total net cash outflows		**173,498**		182,635
Liquidity coverage ratio		**123%**		120%

(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, 2018 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%).

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 2018 vs. Q3 2018

The average LCR for the quarter ended October 31, 2018 was 123%, which translates into a surplus of approximately $39 billion, compared to 120% in the prior quarter. The improvement in the LCR surplus from the previous quarter reflects a decline in net cash outflows resulting from a change in the composition and term profile of the assets and liabilities.

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 64**

	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 (2)	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 (3)										
Unsecured borrowing	$ 46,793	$ 33,849	$ 47,209	$ 30,511	$ 36,116	$ 34,641	$ 50,792	$ 15,693	$ 440,246	$ 735,850
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	27,414	1,003	582	233	414	154	522	6,784	733	37,839
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) Under IFRS 9, investment securities represent debt and equity securities at FVOCI and debt securities at amortized cost, net of the applicable allowance. Under IAS 39, investment securities represented available-for-sale securities and held-to-maturity securities. For further details on the impacts of the adoption of IFRS 9, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

(3) A major portion of relationship-based deposits are repayable on demand or at short notice on a contractual basis while, in practice, these customer balances form a core base for our operations and liquidity needs, as explained in the preceding Deposit and funding profile section.

(Millions of Canadian dollars)	As at October 31, 2017									
	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	$ 58,675	$ 27	$ 22	$ 4	$ –	$ –	$ –	$ –	$ 2,341	$ 61,069
Securities										
Trading (1)	88,083	9	72	3	12	91	61	6,374	32,952	127,657
Investment, net of applicable allowance (2)	1,748	4,690	4,145	2,552	1,545	9,608	24,445	40,772	1,217	90,722
Assets purchased under reverse repurchase agreements and securities borrowed	106,342	47,726	26,207	13,696	14,327	6,624	–	–	6,055	220,977
Loans, net of applicable allowance	15,228	16,024	23,572	27,220	24,086	104,059	206,201	40,028	86,199	542,617
Other										
Customers' liability under acceptances	10,825	5,541	77	–	–	11	5	–	–	16,459
Derivatives	5,619	10,004	4,530	3,290	2,849	9,351	19,459	39,919	2	95,023
Other financial assets	24,577	767	523	90	88	183	184	1,697	1,243	29,352
Total financial assets	$ 311,097	$ 84,788	$ 59,148	$ 46,855	$ 42,907	$ 129,927	$ 250,355	$ 128,790	$ 130,009	$1,183,876
Other non-financial assets	1,820	1,204	92	337	229	745	1,814	986	21,750	28,977
Total assets	$ 312,917	$ 85,992	$ 59,240	$ 47,192	$ 43,136	$ 130,672	$ 252,169	$ 129,776	$ 151,759	$1,212,853
Liabilities and equity										
Deposits (3)										
Unsecured borrowing	$ 40,373	$ 24,425	$ 33,825	$ 35,891	$ 30,641	$ 34,737	$ 48,980	$ 14,709	$ 429,152	$ 692,733
Secured borrowing	1,156	3,989	6,289	5,799	4,064	10,178	20,495	7,659	–	59,629
Covered bonds	–	1,898	1,107	1,331	4,862	7,118	19,732	1,225	–	37,273
Other										
Acceptances	10,825	5,541	77	–	–	11	5	–	–	16,459
Obligations related to securities sold short	30,008	–	–	–	–	–	–	–	–	30,008
Obligations related to assets sold under repurchase agreements and securities loaned	98,409	32,026	4,374	–	93	–	12	–	8,170	143,084
Derivatives	5,765	9,436	4,787	3,388	3,038	9,410	16,924	39,378	1	92,127
Other financial liabilities	25,137	1,118	466	222	296	138	366	3,532	574	31,849
Subordinated debentures	–	–	–	–	–	106	207	8,952	–	9,265
Total financial liabilities	$ 211,673	$ 78,433	$ 50,925	$ 46,631	$ 42,994	$ 61,698	$ 106,721	$ 75,455	$ 437,897	$1,112,427
Other non-financial liabilities	835	3,910	312	135	180	2,747	920	9,170	7,789	25,998
Equity	–	–	–	–	–	–	–	–	74,428	74,428
Total liabilities and equity	$ 212,508	$ 82,343	$ 51,237	$ 46,766	$ 43,174	$ 64,445	$ 107,641	$ 84,625	$ 520,114	$1,212,853
Off-balance sheet items										
Financial guarantees (4)	$ 535	$ 3,030	$ 1,613	$ 2,750	$ 1,426	$ 1,276	$ 4,906	$ 713	$ 46	$ 16,295
Lease commitments	63	125	182	181	181	720	1,471	2,859	–	5,782
Commitments to extend credit (4)	4,532	3,808	7,634	10,706	9,197	26,126	140,985	13,935	6,966	223,889
Other credit-related commitments (4)	526	818	1,252	1,635	1,278	409	661	134	101,864	108,577
Other commitments	38	–	–	–	–	–	–	–	442	480
Total off-balance sheet items	$ 5,694	$ 7,781	$ 10,681	$ 15,272	$ 12,082	$ 28,531	$ 148,023	$ 17,641	$ 109,318	$ 355,023

(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) Under IFRS 9, investment securities represent debt and equity securities at FVOCI and debt securities at amortized cost, net of the applicable allowance. Under IAS 39, investment securities represented available-for-sale securities and held-to-maturity securities. For further details on the impacts of the adoption of IFRS 9, refer to Note 2 of our 2018 Annual Consolidated Financial Statements.

(3) A major portion of relationship-based deposits are repayable on demand or at short notice on a contractual basis while, in practice, these customer balances form a core base for our operations and liquidity needs, as explained in the preceding Deposit and funding profile section.

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

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 65**

	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)	$ 382,847	$ 287,928	$ 52,108	$ 91,154	$ 25,089	$ 839,126
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	1,753	28,568	98	383	6,851	37,653
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

	As at October 31, 2017					
(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)	$ 372,108	$ 253,825	$ 52,026	$ 89,456	$ 22,280	$ 789,695
Other						
Acceptances	–	16,443	10	6	–	16,459
Obligations related to securities sold short	–	30,009	–	–	–	30,009
Obligations related to assets sold under repurchase agreements and securities loaned	8,171	134,904	–	12	–	143,087
Other liabilities	1,124	26,730	78	261	3,553	31,746
Subordinated debentures	–	–	106	207	8,952	9,265
	381,403	461,911	52,220	89,942	34,785	1,020,261
Off-balance sheet items						
Financial guarantees (2), (3)	$ 16,118	$ 177	$ –	$ –	$ –	$ 16,295
Lease commitments	–	732	720	1,471	2,859	5,782
Commitments to extend credit (2), (3)	185,569	38,309	10	1	–	223,889
	201,687	39,218	730	1,472	2,859	245,966
Total financial liabilities and off-balance sheet items	$ 583,090	$ 501,129	$ 52,950	$ 91,414	$ 37,644	$ 1,266,227

* This table represents an integral part of our 2018 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) Amounts have been revised from those previously presented.

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.

Execution 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 our activities, including the practices and controls used to manage other risks. Failure to manage operational risk can result in direct or indirect financial loss, reputational impact, regulatory censure, or failure in the management of other risks such as credit or market risk.

Our management of operational risk follows our established three lines of defence governance model. This model encompasses the organizational roles and responsibilities for a co-ordinated enterprise-wide approach for the management of operational risk. For further details, refer to the Risk management – Enterprise risk management section.

Operational Risk Framework

We have put in place an Enterprise Operational Risk Framework, which is founded on the principles of our Enterprise Risk Management Framework and sets out the processes to identify, assess, manage, monitor and report operational risk. The processes are established through the following core programs:

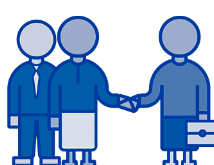
- Internal events: Internal events are specific instances where operational risk leads to or could have led to an unintended, identifiable impact. The internal events program provides a structured and consistent approach for collecting and analyzing internal event data to facilitate the analysis of the operational risk events affecting us.
- External events: External events are operational risk events that affect institutions other than us. External event monitoring and analysis is critical to gain awareness of operational risk experience within the industry and to identify emerging industry trends.
- Business Environment and Internal Control Factors (BEICF) Assessments: BEICF Assessments are conducted to improve business decision-making by gaining awareness of the key risks and the strengths and vulnerabilities of internal controls. Key BEICF Assessment processes include: risk and control self-assessments conducted at both enterprise and business levels; change initiatives and new/amended product assessments conducted to ensure understanding of the risk and reward trade-off for initiatives (e.g., new products, acquisitions, changes in business processes, implementation of new technology, etc.); and that we do not assume risks not aligned with our risk appetite.
- Scenario analysis: Scenario analysis is a structured and disciplined process for making reasonable assessments of infrequent, yet plausible, severe operational risk events. Understanding how vulnerable we are to such “tail risks” identifies mitigating actions and informs the determination of related operational risk thresholds as part of the articulation of operational risk appetite.
- BEICF monitoring: BEICF monitoring is conducted on an ongoing basis through key risk indicators and other assurance/monitoring programs (e.g., business unit monitoring, second line of defence monitoring, audit results, etc.).

Conclusions from the operational risk programs enable learning based on what has happened to us, could it happen again elsewhere in the bank and what controls do we need to amend or implement, support the articulation of operational risk appetite and are used to inform the overall level of exposure to operational risk, which defines our operational risk profile. The 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 risk/reward decisions in striking 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 in order to support proactive management of operational risk and transparency of risk exposures. Reports are provided 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.

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
Information Technology and Cyber Risks	As we continue to digitize our business operations, IT and cyber risks are present in the use, ownership, operation, involvement and adoption of IT within our organization. As described in the Top and emerging risk section of this report, the impact of a cyber-attack could be significant to our businesses and clients. To manage our technology and cybersecurity risk, we have established an enterprise-wide Information Technology Risk Management Framework to establish roles, responsibilities, and proper governance as it relates to IT risk management. We are also advancing our cyber defence and resiliency capabilities by investing in our people, process and technologies to support our business model, protect our systems and enhance the experience of our clients on a global basis.
Third Party Risk 	Third party risk continues to receive attention as we increasingly engage third parties to augment our operational capabilities. Failure to effectively onboard and manage our service providers may expose us to service disruption, financial loss, and other risks. We have established a framework, which sets the guidelines for how to minimize the impact and frequency of exposures from third party relationships through periodic risk assessments, continuous monitoring, and review of contract and procurement practices to ensure appropriate safeguards are in place.
Money Laundering Risk	We have an enterprise-wide program to deter, detect and report suspected money laundering and terrorist financing activities. Our Global Anti-Money Laundering 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.
Privacy Risk	Privacy risk relates to the improper use of personal information or failing to safeguard confidential client, employee or our proprietary information. We are dedicated to protecting the personal information entrusted to the organization. That commitment is fundamental to the way we do business and is reflected in our privacy policies and enterprise-wide training; keeping privacy measures top of mind to ensure personal information is protected across all business processes from the outset.
Climate Change	Climate change continues to impact the frequency and intensity of weather-related events. Although we have not had a significant adverse impact from weather-related events through the course of the year, we have a Business Continuity Management program in place to ensure resiliency in the event of extreme weather to ensure client and business impacts are minimal. We are also developing products, services and advice to assist our clients in the transition to a low carbon economy and in building financial resiliency in the face of climate change.

Operational risk capital
On May 10, 2016, OSFI approved our use of the Advance Measurement Approach (AMA) for operational risk capital measurement subject to the application of a Standardized Approach (TSA) floor. 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. It is expected that we will implement the new Standardized Measurement Approach (SMA) for measuring operational risk capital in Q1 2021 under the final Basel III reforms. The SMA methodology is based on the Business Indicator Component (BIC), 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, SMA will replace all existing approaches (TSA and AMA) in the Basel II framework.

Operational risk loss events
During 2018, we did not experience any material operational risk loss events. For further details on our contingencies, including litigation, refer to Notes 24 and 25 of our 2018 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 will 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.

Regulatory Compliance has developed a Regulatory Compliance Management Framework, which sets out 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 related plans and decisions. 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 Office, Group Executive, 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, service providers (third parties and intra-group), 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 abroad. 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 Trade Agreements
Global trade tensions remain elevated, with both positive and negative developments in recent months. The U.S., Mexico, and Canada successfully concluded trade talks at the beginning of October 2018. The proposed new agreement, the U.S.-Mexico-Canada Agreement, will keep the dispute resolution provision, prevent tariffs in the auto sector, and reduce uncertainty regarding future trading relations within North America; however, certain concessions (such as in the dairy industry) were made and tariffs on steel and aluminum remain in effect. At the same time, tensions between the U.S. and China escalated with additional tariffs being implemented and limited progress toward a negotiated solution. In its semi-annual forecast update, the International Monetary Fund noted that trade tensions were partly responsible for the downgrade of global growth projections for 2018 and 2019.

Consumer Protection
The Canadian federal government has focused attention on issues relating to consumer protection. For example, Canadian regulatory agencies undertook reviews of sales practices at Canadian banks. On March 20, 2018, the Financial Consumer Agency of Canada (FCAC) released a report on its review of sales practices. On September 13, 2018, we received a supervisory letter from FCAC which detailed the FCAC's recommendations and observations arising out of the domestic retail sales practices review they conducted on the Bank. While no widespread misconduct was identified, several areas for improvement were noted. On October 29, 2018 the federal government tabled proposed legislative changes to the consumer protection provisions applicable to banks, including enhancements in areas like corporate governance, business conduct, disclosure and transparency, and new powers for the FCAC.

Privacy
Legislative developments in data privacy are being closely monitored following the enactment of GDPR. California was the first state to enact post-GDPR legislation (effective January 2020), articulating specific individual rights and requirements in connection with the sale of data. In Canada, mandatory breach reporting began on November 1, 2018, and the Privacy Commissioner of Canada (the Commissioner) has called for modernization of legislation given the pace of technological change, including the ability for the Commissioner to audit businesses and levy fines. As European privacy laws are further enhanced to align with the GDPR, legislative and regulatory developments are expected to accelerate around the world.

Canadian Housing Market and Consumer Debt
The Government of Canada and a number of provinces 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.

Payments Issues
The federal government is engaged in several initiatives that could have an impact on the payments system in Canada. This includes the following: amendments to the Canadian Payments Act concerning governance of Payments Canada and access considerations; the development of a regulatory oversight framework for the retail payments system; and initiatives under consideration to modernize the payments system.

London Interbank Offered Rate (LIBOR)
LIBOR is the most widely referenced interest benchmark 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 to alternative risk-free, or nearly risk-free, rates that are based on actual overnight transactions. The main accelerator for the change has been the U.K. Financial Conduct Authority's (FCA) statement last year that after 2021, the FCA will no longer persuade or compel panel banks to make the submissions required to calculate LIBOR. As a result, U.K. and U.S. regulators have warned the industry they will need to be prepared for LIBOR 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 LIBOR as the reference rate, will be impacted.

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; proposed changes to the regulatory framework for the anti-money laundering regime in Canada; 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 Regulatory Initiatives
Policymakers are considering reforms to various U.S. regulations, certain of which may, if implemented, result in reduced complexity of the U.S. regulatory framework and lower compliance costs. These include possible reforms to the Volcker Rule; the SEC's proposed standards of conduct for brokers and advisors (i.e. Regulation Best Interest); the regulation of OTC derivatives; and key aspects of the capital, leverage, liquidity, and oversight framework in the U.S. (e.g., enhanced prudential standards applicable to foreign bank organizations; the Fed's Comprehensive Capital Analysis and Review program; and total loss absorbing capacity rules). These initiatives may lead to financial regulatory reforms, the extent, timing, and impact of which are unknown at this time.

United States Tax Reform
In December 2017, the U.S. Tax Cuts and Jobs Act legislation (U.S. Tax Reform) was signed into law. Most provisions of the new law took effect at the beginning of calendar 2018 or for fiscal years starting in 2018. The tax law reduces individual and corporate rates and permits expensing of many capital expenditures. The law also eliminates deductions for Federal Deposit Insurance Corporation premiums and tightens deductibility rules for meals and entertainment, as well as certain legal settlement costs. In addition, a portion of executive salaries allocated to the U.S. would be non-deductible. Effective for fiscal years beginning after December 31, 2017, the law also established a Base Erosion Anti-Abuse Tax (BEAT) that may have an impact on cross-border related party payments. Regulations implementing and/or clarifying certain aspects of the legislation are being released on a rolling basis.

U.K. and European Regulatory Reform
The revised directive and regulation on Markets in Financial Instruments (MiFID II/MiFIR) became effective January 2018 with a significant technological and procedural impact for certain businesses operating in the EU. The reforms will introduce changes to pre- and post-trade transparency, market structure, trade and transaction reporting, algorithmic trading, and conduct of business.

The U.K. remains in negotiations with regards to its exit from the EU, scheduled to take place on March 29, 2019. There is political agreement on a transition period which will extend until December 31, 2020; however, legal certainty on transition will only be provided on ratification of the Withdrawal Agreement which is currently under discussion. Until the date of its exit or, if there is a transition period, until the period expires, the U.K. will continue to remain an EU Member State, subject to all EU legislation.

Other forthcoming regulatory initiatives include: the extension of the Senior Managers Regime to all U.K. regulated firms which is effective December 2019; transaction reporting of securities financing transactions which is expected to take effect in the first calendar quarter of 2019; and the implementation of new settlement disciplines, including mandatory buy-ins, for participants in European Central Securities Depositories which is effective 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. The competition for clients among financial services companies in the markets in which we operate is intense. 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, are increasingly offering services traditionally provided by banks. This competition could also reduce net interest income and fee revenue and 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.

Our earnings are also sensitive to changes in interest rates, which have increased in Canada and the U.S. over the last year but remain historically low. 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 largely in Personal & Commercial Banking and Wealth Management. While a further increase in interest rates would benefit our businesses, 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 Risk management – 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 the bank 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 relationship with clients, shareholders, and regulators, and our reputation.

Our approach to taxation is grounded in principles which are reflected in our Code of Conduct and is governed by our Taxation Policy and Risk Management Framework, and reflects the fundamentals of our risk pyramid. Oversight of our tax policy and the management of tax risk is the responsibility of Group Executive, 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.

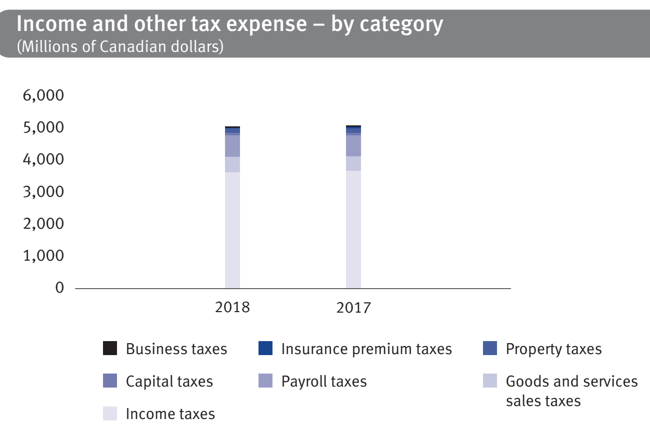
With respect to assessing the needs of our clients, we consider a number of factors including the purposes of the transaction. We seek to ensure that we only support bona fide client transactions with a business purpose and economic substance. Should we become aware of client transactions that are aimed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

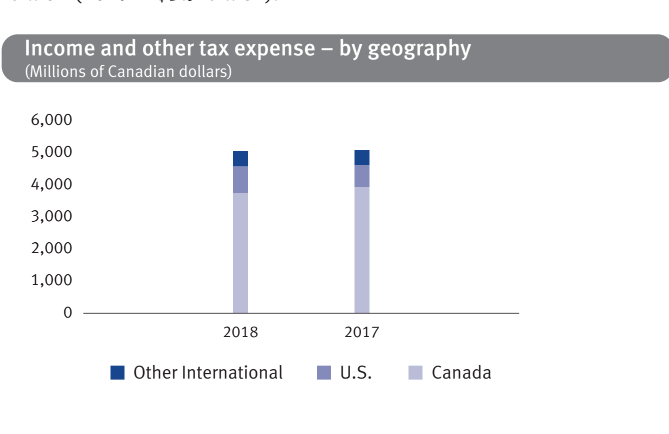
Given that we operate globally, complex tax legislation and accounting principles have resulted in differing legal interpretations between the respective tax authorities we deal with and ourselves, and we are at risk of tax authorities disagreeing with prior positions we have taken for tax purposes. 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 2018, 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 $5.0 billion (2017 – $5.1 billion). In Canada, total income and other tax expense for the year ended October 31, 2018 to various levels of government totalled $3.8 billion (2017 – $3.9 billion).

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



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



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

Environmental and social risk

Environmental and social (E&S) risk is the risk that an E&S issue associated with a client, transaction, product, supplier or activity will create a risk of loss of financial, operational, legal and/or reputational value to us. E&S issues include, but are not limited to, site contamination, waste management, land and resource use, biodiversity, water quality and availability, climate change, environmental regulation, human rights, Indigenous Peoples' rights and consultation, 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 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 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) Investor 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. This year we considered 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 the execution of the management of E&S risks and opportunities. The Board provides oversight of our environmental strategy and our E&S risks, including our approach to managing these risks. 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.

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 it is reported on a regular basis to senior management and the Board.

We conduct portfolio, client and scenario analysis 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 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).

Potential Risk	Actions
Emerging regulatory and legal requirements	• We monitor regulations that may be applicable to the bank, including those related to carbon pricing, climate-related disclosures, and sustainable finance. • 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 advisory services, and socially responsible investing). • In fiscal 2018, we participated in a United Nations initiative to develop and publish methodologies for assessing the impact of transition and physical risks on our loan portfolio under different climate change scenarios. We piloted this methodology on some of our retail and wholesale lending portfolios, selected based on the potential materiality of the risk and our level of credit exposure to the portfolio. Based on our analysis the impact of climate change was not deemed financially material to those portfolios. • Our asset management businesses integrate ESG issues into their investment process when doing so may have a material impact on investment risk or return. In 2018, our Approach to Responsible Investment, which is applicable to our asset management business, was amended to include climate change related issues. • 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, 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 Green House Gas (GHG) Protocol. We also receive third-party limited assurance of our energy and emissions metrics.

Other factors
Other factors that may affect our results include changes in government trade policy, changes in accounting standards, including 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, 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.

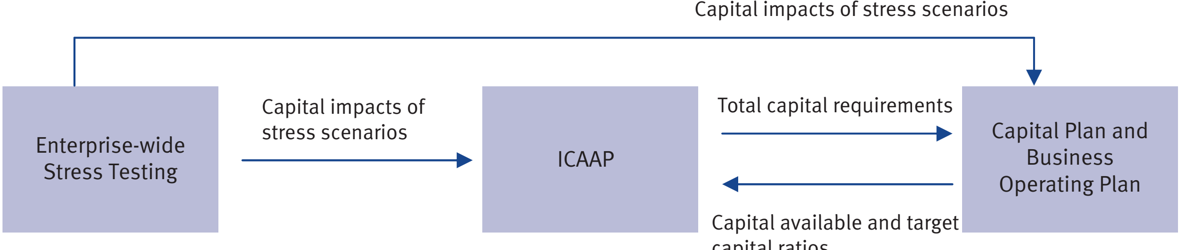
Capital management

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 provide support for our business segments and clients. We also aim to generate better returns for our shareholders, while protecting depositors and senior creditors.

Capital management framework
Our capital management framework establishes policies and processes for defining, measuring, raising and investing all forms of capital in a co-ordinated 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, economic 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 test and ICAAP, regulatory capital and 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 test and annual ICAAP 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 (both economic and regulatory), 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 "all-in" regulatory targets. The stress test results of our Enterprise-wide stress testing and ICAAP 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 ensuring 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 regulatory minimum 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 Risk Committee annually approves the Capital Management Framework. 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, which will be required to be fully phased-in (“all-in”) to 7.0%, 8.5% and 10.5%, respectively, and effective for us for 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 “all-in” 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).

In 2014, OSFI also advised Canadian banks that it would begin phasing in the Credit Valuation Adjustment (CVA) risk capital charge required under the Basel III framework. In accordance with OSFI’s guidance, there are two possible options to phase-in the CVA capital charge. Under the option selected by RBC, the 2018 CVA capital charge for CET1, Tier 1 capital and Total capital was 80%, 83% and 86%, respectively. In 2019, the CVA capital charge will be 100% for each tier of capital.

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 use the higher of the Standardized Approach and the Advanced Measurement Approach. 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 21, 2017, we were 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%. OSFI mandates the higher of the D-SIB or G-SIB requirement to be applied. 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 November 16, 2018, we remained designated a G-SIB on FSB’s annual updated G-SIB list.

Effective February 1, 2018, OSFI prescribed revisions to the current Basel I regulatory capital floor requiring a transition to a new regulatory capital floor of 75% of RWA based on the Basel II Standardized Approaches. This new regulatory floor was transitioned over three quarters reflecting a regulatory capital floor requirement of 70%, 72.5%, and 75% in Q2 2018, Q3 2018, and Q4 2018, respectively.

On June 20, 2018, OSFI announced that all D-SIBs will be 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 1.5% of total RWA 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.

In accordance with the BCBS’ *Revised Pillar 3 Disclosure Requirements*, which were adopted by OSFI in 2017 and effective in the fourth quarter of 2018, we have published our first standalone Pillar 3 Report for the year ended October 31, 2018. These requirements replace existing disclosures as applicable in certain areas in the Risk management section. The new requirements require comprehensive disclosure of our risks and regulatory capital, including our methodologies used in calculating capital requirements. In addition to the quantitative and qualitative disclosures in our Pillar 3 Report, we have also reflected certain disclosures, as permitted, in this 2018 Annual Report.

For further details on regulatory developments, 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 capital and leverage requirements imposed by OSFI:

Basel III – OSFI regulatory target **Table 66**

Basel III Capital ratios and leverage	OSFI regulatory target requirements for large banks under Basel III					RBC capital and leverage ratios as at October 31, 2018	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%	11.5%	1.5%	> 9.5%
Tier 1 capital	> 6.0%	2.5%	> 8.5%	1.0%	> 9.5%	12.8%	1.5%	> 11.0%
Total capital	> 8.0%	2.5%	> 10.5%	1.0%	> 11.5%	14.6%	1.5%	> 13.0%
Leverage ratio	> 3.0%	n.a.	> 3.0%	n.a.	> 3.0%	4.4%	n.a.	> 3.0%

(1) The capital buffers include the capital conservation buffer and the countercyclical capital buffer as prescribed by OSFI.
(2) Effective January 1, 2018, 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 June 20, 2018, OSFI required the public disclosure of their Pillar 2 DSB.
n.a. not applicable.

Regulatory capital, RWA and capital ratios

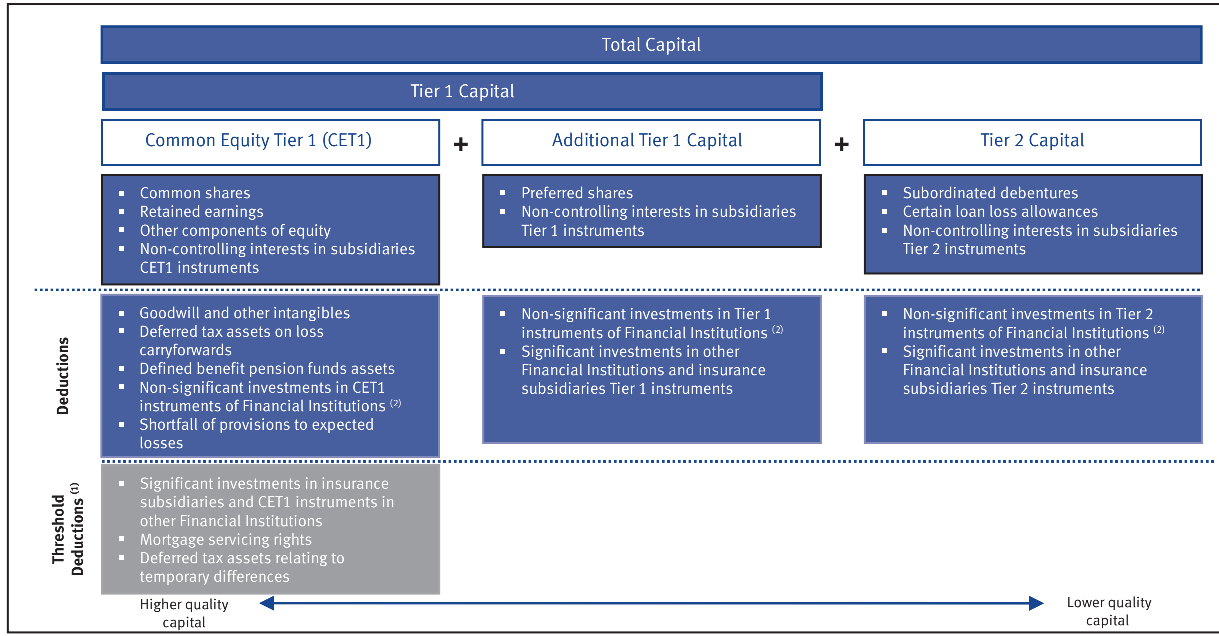
Under Basel III, regulatory capital consists of CET1, Additional Tier 1 and Tier 2 capital.

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 includes subordinated debentures that meet certain criteria, certain loan loss allowances and non-controlling interests in subsidiaries Tier 2 instruments. 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 Capital Adequacy Requirements (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:

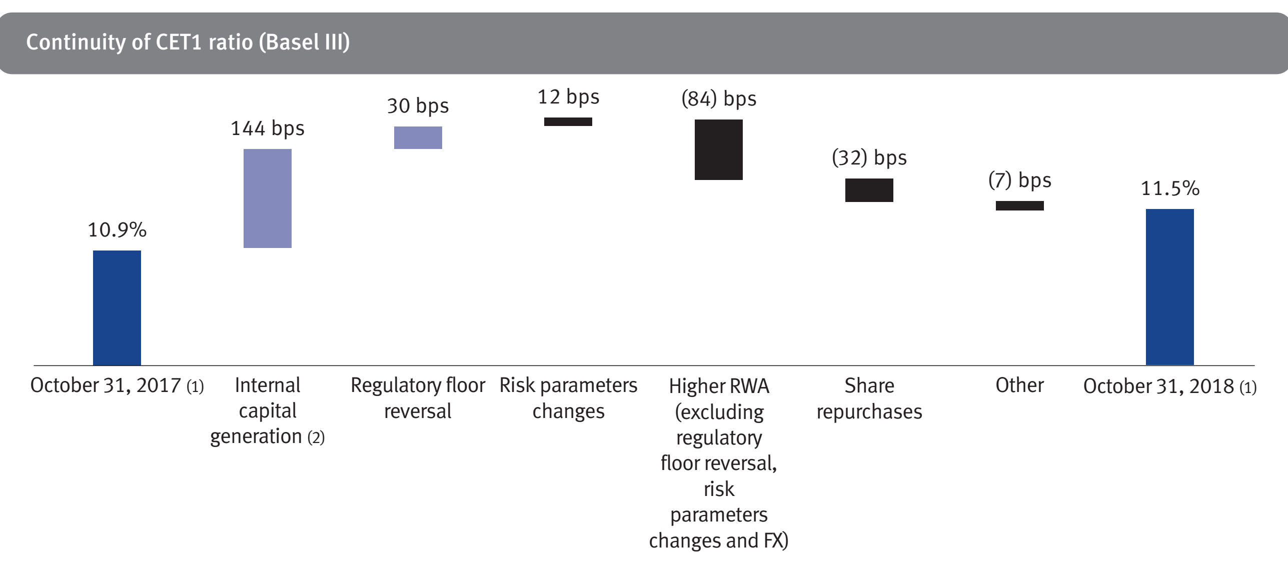
Regulatory capital, risk-weighted assets (RWA) and capital and leverage ratios **Table 67**

	As at	
(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	October 31 2018	October 31 2017
Capital (1)		
CET1 capital	$ 57,001	$ 51,572
Tier 1 capital	63,279	58,361
Total capital	72,494	67,556
Risk-weighted Assets (RWA) used in calculation of capital ratios (1), (2)		
CET1 capital RWA	$ 495,528	$ 474,478
Tier 1 capital RWA	495,993	474,478
Total capital RWA	496,459	474,478
Total capital RWA consisting of: (1)		
Credit risk	$ 401,534	$ 376,519
Market risk	32,209	27,618
Operational risk	62,716	59,203
Regulatory floor adjustment (3)	–	11,138
Total capital RWA	$ 496,459	$ 474,478
Capital ratios and Leverage ratio (1)		
CET1 ratio	11.5%	10.9%
Tier 1 capital ratio	12.8%	12.3%
Total capital ratio	14.6%	14.2%
Leverage ratio	4.4%	4.4%
Leverage ratio exposure (billions)	$ 1,450.8	$ 1,315.5

(1) Capital, RWA, and capital ratios are calculated using OSFI's Capital Adequacy Requirements (CAR) based on the Basel III framework ("all-in" basis). The Leverage ratio is calculated using OSFI Leverage Requirements Guideline based on the Basel III framework.
(2) In fiscal 2018, the CVA scalars are 80%, 83% and 86%, respectively. In 2017, the scalars were 72%, 77% and 81%, respectively.
(3) Before any capital floor requirement as applicable, there are three different levels of RWAs for the calculation of the CET1, Tier 1, and Total capital ratios arising from the option we have chosen for the phase-in of the CVA capital charge. Since the introduction of Basel II in 2008, OSFI has prescribed a capital floor requirement for institutions that use the advanced internal ratings-based (AIRB) approach for credit risk. The capital floor was determined by comparing a capital requirement under Basel I and Basel III, as specified by OSFI. If the capital requirement under the Basel III standards was less than 90% of the capital requirements as calculated under the Basel I standards, the difference was added to the RWAs. Effective February 1, 2018, OSFI prescribed the transition from the current Basel I regulatory capital floor to a new regulatory capital floor of 75% of RWA based on the Basel II Standardized Approaches.

Regulatory Capital	Table 68	
	All-in basis	
(Millions of Canadian dollars)	2018	2017
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	$ 17,922	$ 18,019
Retained earnings	50,807	45,043
Accumulated other comprehensive income (and other reserves)	4,823	4,354
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)	13	13
Regulatory adjustments applied to CET1 under Basel III	(16,564)	(15,857)
Common Equity Tier 1 capital (CET1)	$ 57,001	$ 51,572
Additional Tier 1 capital: instruments and regulatory adjustments		
Directly issued qualifying Additional Tier 1 instruments plus related stock surplus	$ 3,825	$ 3,825
Directly issued capital instruments to phase out from Additional Tier 1	2,450	2,961
Additional Tier 1 instruments issued by subsidiaries and held by third parties (amount allowed in group AT1)	3	3
Regulatory adjustments applied to Additional Tier 1 under Basel III	–	–
Additional Tier 1 capital (AT1)	$ 6,278	$ 6,789
Tier 1 capital (T1 = CET1 + AT1)	$ 63,279	$ 58,361
Tier 2 capital: instruments and provisions and regulatory adjustments		
Directly issued qualifying Tier 2 instruments plus related stock surplus	$ 6,230	$ 6,346
Directly issued capital instruments subject to phase out from Tier 2	2,509	2,550
Tier 2 instruments issued by subsidiaries and held by third parties (amount allowed in group Tier 2)	14	12
Collective allowance	462	287
Regulatory adjustments applied to Tier 2 under Basel III	–	–
Tier 2 capital (T2)	$ 9,215	$ 9,195
Total capital (T1 + T2)	$ 72,494	$ 67,556

2018 vs. 2017



(1) Represents rounded figures.
(2) Internal capital generation of $6.9 billion which represents Net income available to shareholders, less common and preferred shares dividends.

Our CET1 ratio was 11.5%, up 60 bps from last year. The increase mainly reflects internal capital generation, the reversal of the Basel I regulatory floor adjustment, and risk parameters changes. These factors were partially offset by higher RWA due to business growth, and share repurchases. Our risk parameters and methodology updates are validated on a regular basis.

Our Tier 1 capital ratio of 12.8% was up 50 bps, mainly due to the factors noted above under the CET1 ratio and the redemption of RBC Trust Capital Securities.

Our Total capital ratio of 14.6% was up 40 bps, mainly due to the factors noted above under the Tier 1 ratio.

Our Leverage ratio of 4.4% was flat, as internal capital generation was offset by higher business growth leverage exposures, primarily in repo-style transactions, loans, and off-balance sheet exposures, share repurchases, and the redemption of RBC Trust Capital Securities.

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 capital floor requirement must be maintained as prescribed by OSFI's CAR guidelines. Effective February 1, 2018, the capital floor required is 75% of RWA as calculated by Basel II standards. Prior to February 1, 2018, the capital floor required was 90% of RWA as calculated by Basel I standards. If the capital requirement is less than the required threshold, a floor adjustment to RWA must be applied as prescribed by OSFI CAR guidelines.

Total capital risk-weighted assets — **Table 69**

As at October 31 (Millions of Canadian dollars, except percentage amounts)	2018						2017
			Risk-weighted assets				
	Exposure (1)	Average of risk-weights (2)	Standardized approach	Advanced approach	Other	Total	Total
Credit risk							
Lending-related and other							
Residential mortgages	$ 259,528	8%	$ 7,116	$ 14,803	$ –	$ 21,919	$ 18,197
Other retail	255,747	22%	6,908	48,761	–	55,669	53,749
Business	355,587	58%	45,630	160,105	–	205,735	187,163
Sovereign	145,036	8%	2,181	9,256	–	11,437	11,735
Bank	140,682	7%	1,622	8,617	–	10,239	11,267
Total lending-related and other	$ 1,156,580	26%	$ 63,457	$ 241,542	$ –	$ 304,999	$ 282,111
Trading-related							
Repo-style transactions	$ 658,100	1%	$ 106	$ 7,976	$ 34	$ 8,116	$ 8,520
Derivatives – including CVA – CET1 phase-in adjustment	97,496	32%	661	17,522	12,990	31,173	28,388
Total trading-related	$ 755,596	5%	$ 767	$ 25,498	$ 13,024	$ 39,289	$ 36,908
Total lending-related and other and trading-related	$ 1,912,176	18%	$ 64,224	$ 267,040	$ 13,024	$ 344,288	$ 319,019
Bank book equities	3,245	128%	–	4,161	–	4,161	3,485
Securitization exposures	63,338	16%	3,850	6,134	–	9,984	8,462
Regulatory scaling factor	n.a.	n.a.	n.a.	16,608	–	16,608	15,306
Other assets	19,169	133%	n.a.	n.a.	25,562	25,562	28,836
Total credit risk	$ 1,997,928	20%	$ 68,074	$ 293,943	$ 38,586	$ 400,603	$ 375,108
Market risk							
Interest rate			$ 4,547	$ 4,950	$ –	$ 9,497	$ 6,910
Equity			1,501	2,364	–	3,865	2,832
Foreign exchange			862	100	–	962	735
Commodities			159	31	–	190	245
Specific risk			5,907	2,098	–	8,005	7,193
Incremental risk charge			–	9,690	–	9,690	9,703
Total market risk			$ 12,976	$ 19,233	$ –	$ 32,209	$ 27,618
Operational risk			$ 5,194	$ 57,522	n.a.	$ 62,716	$ 59,203
Regulatory floor adjustment (3)					–	–	12,549
CET1 capital risk-weighted assets (4)	$ 1,997,928		$ 86,244	$ 370,698	$ 38,586	$ 495,528	$ 474,478
Additional CVA adjustment, prescribed by OSFI, for Tier 1 capital					465	465	784
Regulatory floor adjustment (3)					–	–	(784)
Tier 1 capital risk-weighted assets (4)	$ 1,997,928		$ 86,244	$ 370,698	$ 39,051	$ 495,993	$ 474,478
Additional CVA adjustment, prescribed by OSFI, for Total capital					466	466	627
Regulatory floor adjustment (3)					–	–	(627)
Total capital risk-weighted assets (4)	$ 1,997,928		$ 86,244	$ 370,698	$ 39,517	$ 496,459	$ 474,478

(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) Before any capital floor requirement as applicable, there are three different levels of RWAs for the calculation of the CET1, Tier 1, and Total capital ratios arising from the option we have chosen for the phase-in of the CVA capital charge. Since the introduction of Basel II in 2008, OSFI has prescribed a capital floor requirement for institutions that use the advanced internal ratings-based (AIRB) approach for credit risk. The capital floor is determined by comparing a capital requirement under Basel I and Basel III, as specified by OSFI. Effective February 1, 2018, if the capital requirement under the Basel III standards is less than 75% of the capital requirements as calculated under the Basel II Standardized Approaches, the difference is added to the RWAs. Prior to February 1, 2018, the threshold was 90% of the capital requirements as calculated under the Basel I standards.
(4) In fiscal 2018, the CVA scalars are 80%, 83% and 86%, respectively. In 2017, the scalars were 72%, 77% and 81%, respectively.
n.a. not applicable.

2018 vs. 2017

During the year, CET1 RWA was up $21 billion, primarily reflecting business growth in wholesale loans and underwriting activities, trading portfolios, and residential mortgages, partially offset by the reversal of Basel I regulatory floor adjustment and risk parameters changes.

Selected capital management activity
The following table provides our selected capital management activity:

Selected capital management activity			Table 70
	October 31, 2018		
(Millions of Canadian dollars, except number of shares)	Issuance or redemption date	Number of shares (000s)	Amount
Tier 1 capital			
Common shares activity			
Issued in connection with share-based compensation plans (1)		1,466	$ 92
Purchased for cancellation		(15,335)	(187)
Redemption of preferred shares, Series C-1	November 13, 2017	(82)	(107)
Redemption of RBC Trust Capital Securities, Series 2008-1 (2)	June 30, 2018		(500)

(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 19 of our 2018 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. The NCIB commenced on February 27, 2018 and will continue until February 26, 2019 or such earlier date as we complete the repurchase of all shares permitted under the bid. In 2017, we announced a NCIB for the purchase of up to 30 million of our common shares, which commenced on March 14, 2017 and was completed on January 31, 2018. 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.

In 2018, the total number of common shares repurchased and cancelled under our NCIB programs was approximately 15.3 million, including 9.3 million common shares repurchased pursuant to specific share repurchase programs. The total cost of the shares repurchased was $1,522 million. The total number of common shares repurchased and cancelled under the current NCIB program, which commenced on February 27, 2018, was approximately 6.0 million. The total cost of these repurchased shares was $599 million. The price paid for repurchased shares was the prevailing market price at the time of acquisition, with the exception of purchases made under specific share repurchase programs, which were at a discount to the prevailing market price at the time of the purchases.

We issued innovative capital instruments, RBC Trust Capital Securities, through our structured entity RBC Capital Trust (Trust). On June 30, 2018, the Trust redeemed all 500,000 units of its issued and outstanding RBC Trust Capital Securities – Series 2008-1 at a redemption price of $1,000 per unit.

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.

During the year, we also announced our intention to redeem 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, on February 24, 2019. The shares will be redeemed at a price of $25 per share.

Dividends

Our common share dividend policy reflects our earnings outlook, payout ratio objective and the need to maintain adequate levels of capital to support business plans. In 2018, our dividend payout ratio was 45%, which met our dividend payout ratio target of 40% to 50%. Common share dividends paid during the year were $5.4 billion.

Selected share data (1) **Table 71**

	2018			2017		
(Millions of Canadian dollars, except number of shares and as otherwise noted)	**Number of shares** (000s)	**Amount**	**Dividends declared per share**	Number of shares (000s)	Amount	Dividends declared per share
Common shares issued	**1,439,029**	**$ 17,635**	**$ 3.77**	1,452,898	$ 17,730	$ 3.48
Treasury shares – common shares	**(235)**	**(18)**		(363)	(27)	
Common shares outstanding	**1,438,794**	**$ 17,617**		1,452,535	$ 17,703	
Stock options and awards						
Outstanding	**8,504**			9,315		
Exercisable	**3,726**			4,337		
Available for grant	**9,262**			9,933		
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 AB (3)	**–**	**–**	**–**	–	–	0.99
Non-cumulative Series AC	**8,000**	**200**	**1.15**	8,000	200	1.15
Non-cumulative Series AD	**10,000**	**250**	**1.13**	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)	**13,579**	**339**	**0.88**	13,579	339	0.88
Non-cumulative Series AK (4)	**2,421**	**61**	**0.78**	2,421	61	0.62
Non-cumulative Series AL (4)	**12,000**	**300**	**1.07**	12,000	300	1.07
Non-cumulative Series AZ (4), (5)	**20,000**	**500**	**1.00**	20,000	500	1.00
Non-cumulative Series BB (4), (5)	**20,000**	**500**	**0.98**	20,000	500	0.98
Non-cumulative Series BD (4), (5)	**24,000**	**600**	**0.90**	24,000	600	0.90
Non-cumulative Series BF (4), (5)	**12,000**	**300**	**0.90**	12,000	300	0.90
Non-cumulative Series BH (5)	**6,000**	**150**	**1.23**	6,000	150	1.23
Non-cumulative Series BI (5)	**6,000**	**150**	**1.23**	6,000	150	1.23
Non-cumulative Series BJ (5)	**6,000**	**150**	**1.31**	6,000	150	1.31
Non-cumulative Series BK (4), (5)	**29,000**	**725**	**1.38**	29,000	725	1.38
Non-cumulative Series BM (4), (5)	**30,000**	**750**	**1.38**	30,000	750	1.38
Non-cumulative Series C-1 (6), (7)	**–**	**–**	**US$ –**	82	107	US$ 55.00
Non-cumulative Series C-2 (7)	**20**	**31**	**US$ 67.50**	20	31	US$ 67.50
Preferred shares issued	**251,020**	**$ 6,306**		251,102	$ 6,413	
Treasury shares – preferred shares (8)	**114**	**3**		6	–	
Preferred shares outstanding	**251,134**	**$ 6,309**		251,108	$ 6,413	
Dividends						
Common		**$ 5,442**			$ 5,096	
Preferred		**285**			300	

(1) For further details about our capital management activity, refer to Note 20 of our 2018 Annual Consolidated Financial Statements.
(2) Effective February 24, 2010, we have the right to convert these items into common shares at our option, subject to certain restrictions.
(3) On September 27, 2017, we redeemed all 12 million issued and outstanding Non-cumulative First Preferred Shares, Series AB, for cash at a redemption price of $25 per share.
(4) Dividend rate will reset every five years.
(5) Non-viable contingent capital (NVCC) instruments.
(6) On November 13, 2017, we redeemed all 82,050 issued and outstanding Non-Cumulative Perpetual First Preferred Shares, Series C-1, for cash at a redemption price of US$1,000 per share (equivalent to US$25 per related depositary share).
(7) Represents 3,282,000 and 815,400 depositary shares relating to preferred shares Series C-1 and Series C-2, respectively. Each depositary share represents one-fortieth interest in a share of Series C-1 and Series C-2, respectively.
(8) Positive amounts represent a short position in treasury shares.

As at November 23, 2018, the number of outstanding common shares was 1,439,643,158, including a short position in treasury shares of 595,209, and the number of outstanding stock options and awards was 8,488,618.

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, preferred shares Series BB, preferred shares Series BD, preferred shares Series BF, preferred shares Series BH, preferred shares Series BI, preferred shares Series BJ, preferred shares Series BK, preferred shares Series BM, subordinated debentures due on July 17, 2024, subordinated debentures due on September 29, 2026, subordinated debentures due on June 4, 2025, subordinated debentures due on January 20, 2026 and subordinated debentures due on January 27, 2026, 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 2,751 million RBC common shares, in aggregate, which would represent a dilution impact of 65.66% based on the number of RBC common shares outstanding as at October 31, 2018.

Attributed capital

Our methodology for allocating capital to our business segments is based on the higher of fully diversified economic capital and the Basel III regulatory capital requirements. 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.

Attributed capital is calculated and attributed on a wider array of risks compared to Basel III regulatory capital requirements, which are calibrated predominantly to target credit, market (trading) and operational risk measures. Economic capital is our internal quantification of risks associated with business activities which is the capital required to remain solvent under extreme market conditions, reflecting our objective to maintain strong credit ratings. Economic capital is calculated based on credit, market (trading and non-trading), operational, business and fixed asset, and insurance risks, along with capital attribution for goodwill and other intangibles. The common risks between the two frameworks are aligned to reflect increased regulatory requirements.

- Business risk is the risk of loss or harm due to variances in volumes, prices and costs caused by competitive forces, regulatory changes, reputation and strategic risks.
- Fixed asset risk is defined as the risk that the value of fixed assets will be less than their book value at a future date.

For further discussion on Credit, Market, Operational and Insurance risks, refer to the Risk management section.

Attributed capital is also used to assess the adequacy of our capital base. Our policy is to maintain a level of available capital, defined as common equity and other capital instruments with equity-like loss absorption features such as preferred shares that exceed Economic capital with a comfortable cushion.

The calculation and attribution of capital involves a number of assumptions and judgments by management which are monitored to ensure that the economic 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.

The following outlines our attributed capital:

Attributed capital — **Table 72**

(Millions of Canadian dollars)	2018	2017
Credit risk	$ 22,200	$ 21,450
Market risk (trading and non-trading)	3,800	3,250
Operational risk	5,600	5,200
Business and fixed asset risk	3,400	3,200
Insurance risk	700	650
Goodwill and other intangibles	15,550	15,550
Regulatory capital allocation	12,450	10,950
Attributed capital	$ 63,700	$ 60,250
Unattributed capital	5,200	5,050
Average common equity	$ 68,900	$ 65,300

2018 vs. 2017

Attributed capital increased $3 billion, mainly due to organic business growth.

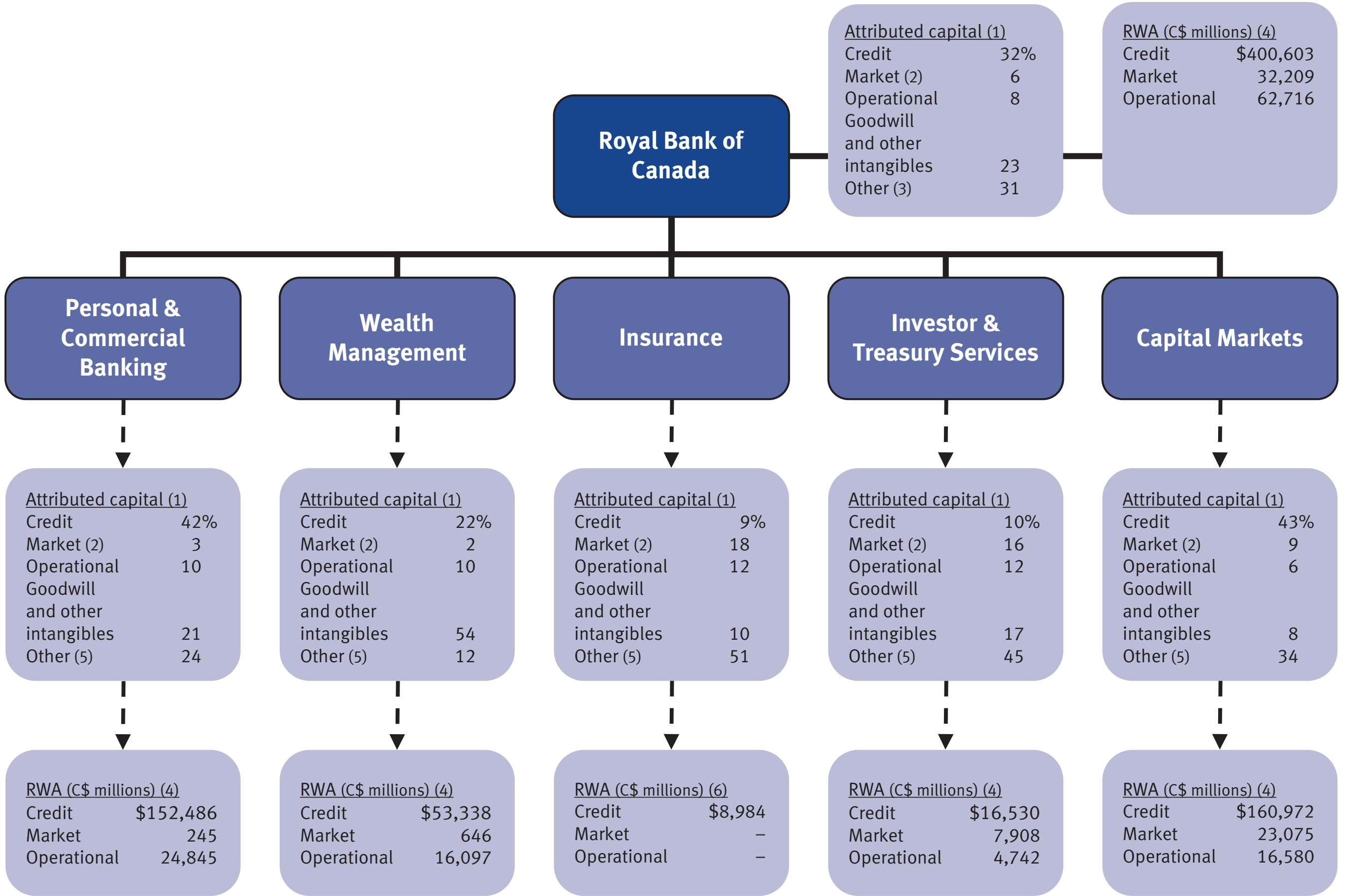
We remain well capitalized with current levels of available capital exceeding the attributed capital required to underpin all of our material risks.

Attributed capital in the context of our business activities

In carrying out our business activities, we are exposed to a range of risks. The following chart provides a high level view of risks within our business segments, which includes credit, market and operational risks. We have used attributed capital to illustrate the relative size of the risks in each of our businesses. The attributed capital distribution reflects the diversified nature of our business activities. RWA represents our exposure to credit, market and operational risk for regulatory capital requirements.

Within Personal & Commercial Banking, credit risk is the most significant risk, largely related to our personal financial services and business financial services. The primary risks within Wealth Management, which provides services to institutional and individual clients, are operational risk and credit risk. Risks within our Insurance operations are primarily related to insurance risk in our life and health businesses followed by market risk and operational risk. The largest risk within Investor & Treasury Services is market risk, followed by credit risk and operational risk. The most significant risk within Capital Markets is credit risk, followed by market risk.

For additional information on the risks highlighted below, refer to the Risk management section.



(1) Attributed capital: An estimate of the amount of equity capital required to underpin risks. It is calculated by estimating the average level of capital that is necessary to support our various businesses, given their risks, consistent with our desired solvency standard and credit ratings.
(2) Market risk attributed capital: An estimate of the amount of equity capital required to underpin trading market risk and interest rate risk.
(3) Other – RBC: Includes (a) an estimate of the amount of equity capital required to underpin risks associated with business, fixed assets and insurance risks; (b) a regulatory capital adjustment since attributed capital is determined at the higher of regulatory or economic capital; and (c) unattributed capital reported representing common equity in excess of common equity attributed to our business segments which is reported in the Corporate Support segment only.
(4) RWA amount represents period-end spot balances and RWA for CET1.
(5) Other – Business segments: Includes (a) an estimate of the amount of equity capital required to underpin risks associated with business, fixed assets and insurance risks; and (b) a regulatory capital adjustment since attributed capital is determined at the business segment level as the greater of regulatory or economic capital.
(6) Insurance RWA amount above represents our investments in the insurance subsidiaries capitalized at the regulatory prescribed rate as required under Basel CAR filing.

Subsidiary capital

Our capital management framework includes the management of subsidiaries' capital. We invest capital across the enterprise to meet local regulators' capital adequacy requirements and maximize returns to our shareholders. We set guidelines for defining capital investments in our subsidiaries and manage the relationship between capital invested in subsidiaries and our consolidated capital base to ensure that we can access capital recognized in our consolidated regulatory capital measurements.

Each of our subsidiaries has responsibility for maintaining compliance with local regulatory capital adequacy requirements, which may include restrictions on the transfer of assets in the form of cash, dividends, loans or advances. Concurrently, Corporate Treasury provides centralized oversight of capital adequacy across all subsidiary entities.

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

For our securitization exposures, we use an internal assessment approach (IAA) for exposures related to our ABCP business, and for other securitization exposures we use a combination of approaches including a ratings-based approach and the 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 lower of our own rating or the lowest 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

Capital treatment proposed or issued in connection with accounting changes

On March 29, 2017, the BCBS issued a standard which detailed the interim regulatory treatment of accounting provisions under the Basel III regulatory capital framework. The standard addressed the treatment of the impact of new expected credit loss accounting requirements under IFRS 9 for regulatory capital purposes. The standard retained the current Basel lII regulatory treatment of accounting provisions under both the standardized and the internal ratings-based approaches until a longer-term solution is developed. It also set out transitional arrangements which allowed for a phase-in of the impact of the new expected credit loss accounting standard on regulatory capital for up to five years, should individual jurisdictions choose to provide capital relief.

On November 29, 2017, OSFI released the finalized Capital Adequacy Requirements (CAR) Guidelines required to be implemented in the first quarter of 2018. The updated 2018 CAR Guidelines retained the current regulatory treatment of accounting provisions consistent with the BCBS standard. However, OSFI elected not to adopt a phase-in approach relating to the regulatory impact of IFRS 9. Therefore, the full transition impact of IFRS 9 was required to be absorbed by Canadian banks in their first quarter 2018 capital ratios. The updated CAR Guidelines also included revisions requiring the treatment of ACL on performing financial assets (Stage 1 and Stage 2) under IFRS 9 as general allowances for regulatory capital purposes. Similarly, ACL on impaired financial assets (Stage 3) under IFRS 9 were required to be treated as specific allowances for regulatory capital purposes.

As at our transition date of November 1, 2017, our shortfall of accounting allowances under IAS 39 to Basel expected losses was $1.2 billion. The impact of the impairment requirements of IFRS 9 reduced, but did not eliminate, the shortfall of accounting allowances to Basel expected losses. Going forward, the regulatory capital impact of further increases in our accounting allowances under IFRS 9 will be mitigated by way of the reduction of our shortfall allowance deduction from CET1 capital.

Basel III reforms

On December 7, 2017, the BCBS finalized the Basel III reforms, with an effective date of January 2022. The reforms are mainly intended to reduce the variability in bank capital levels and to address a number of weaknesses in the existing capital framework by revisiting the way capital requirements for credit, market and operational risks are determined. This includes revisions to the standardized approach for credit risk, constraints on the use of internal ratings-based approaches, an overhaul of the operational risk framework, calibration of standardized output floors, revisions to the CVA framework, and changes to the leverage ratio framework.

On July 16, 2018, OSFI issued for public consultation a discussion paper on the implementation of the final Basel III reforms in Canada. In this discussion paper, OSFI proposed timelines and implementation changes to the BCBS requirements that it is considering to reflect the Canadian domestic market. We have reviewed OSFI's initial proposals and have provided an industry response through the Canadian Bankers' Association by the requested consultation deadline of October 19, 2018. The proposals put forward in the discussion paper are conceptual in nature. We expect to continue to engage with OSFI in the next year on the domestic implementation of the Basel III reforms and are taking appropriate steps to ensure required adoption readiness based on guidance provided to date. We continue to refine our assessment of the BCBS reforms based on any new guidance provided by BCBS and OSFI, including incorporating this directional conceptual guidance provided by OSFI.

Revisions to the CAR Guidelines for Securitization Framework and the Standardized Approach for Measuring Counterparty Credit Risk (SA-CCR)

On October 30, 2018, OSFI revised its securitization framework in the CAR guidelines to reflect the adoption of the BCBS' *Revisions to the securitisation framework* and *Capital treatment for short-term "simple, transparent and comparable" securitisations.* The revisions also include additional jurisdictional requirements incorporated by OSFI. The new requirements were effective November 1, 2018, however, OSFI provided some transitional arrangements for transactions undertaken before January 1, 2019. In addition, OSFI allowed a one-year grandfathering of securitization credit risk RWA for all exposures held at October 31, 2018. As such, upon the adoption of the revised CAR guidelines, there was no material impact to our capital ratios on November 1, 2018, the date of initial application.

We currently measure our OTC derivative exposures for regulatory capital purposes based on the current exposure method as reflected in Chapter 4 of the CAR guidelines. On October 30, 2018, OSFI also revised its CAR guidelines to incorporate the new BCBS standardized approach methodologies for measuring counterparty credit risk and capital requirements for exposures to central counterparties. This adoption will require our OTC derivative exposures to be reflected under the SA-CCR, instead of our existing methodology based on the current exposure method (both non-modelled approaches). The revised guidelines are effective November 1, 2018.

Based on current estimates, the adoption of these guidelines is expected to decrease the CET1 ratio by approximately 10-15 bps, including the full phase-in of CVA RWA, in the next quarter. This amount is subject to change based on portfolio growth or portfolio mix held.

Leverage Framework

On October 30, 2018, OSFI published its updated Leverage Requirements Guideline, effective for November 1, 2018. The revisions align the leverage guideline with OSFI's upcoming Q1 2019 adoption of the BCBS' standard on *The standardized approach for measuring counterparty credit risk exposures* and *The revisions to the securitization framework* reflected in OSFI's 2019 CAR guideline. Upon the adoption of these guidelines, we expect a reduction of approximately 8-12 bps to our leverage ratio in the first quarter of adoption. This amount is subject to change based on portfolio growth or portfolio mix held.

On November 20, 2018, OSFI also finalized the Leverage Ratio Disclosure Requirements guideline, effective for November 1, 2018. We will begin disclosing the new requirements in the first quarter of 2019.

Regulatory Capital and Related Requirements

We continue to monitor newly proposed regulatory requirements by BCBS and OSFI. The BCBS' consultative guidances are reviewed and responded to where required and we actively engage in discussions with OSFI. The impact of any proposals on us will depend on the final standards adopted by the BCBS and how these standards are implemented by OSFI. For further details on regulatory capital, refer to the Capital Management section.

Liquidity

Net Stable Funding Ratio (NSFR) implementation timeline

With respect to liquidity measurement, in October 2014, the BCBS released its final Net Stable Funding Ratio (NSFR) standard, which requires banks to fund their activities with sufficiently stable sources of funding. The NSFR is intended to reduce structural funding risk by requiring banks to have sufficient stable funding to support their business with less reliance on funding maturing in one year. On February 6, 2018, OSFI announced that it would extend the implementation timeline for Canadian banks to comply with the NSFR requirements from January 1, 2019 to January 1, 2020.

Other Regulatory Changes

Canadian Bank Recapitalization (Bail-in) Regime

Bail-in regimes are being implemented in a number of jurisdictions in an effort to limit taxpayer exposure to losses of a failing institution and ensure the institution's shareholders and creditors remain responsible for bearing such losses. On June 22, 2016, legislation came into force, amending certain federal statutes pertaining to banks to create a bank recapitalization, or "bail-in" regime, for the six systemically important banks in Canada. On April 18, 2018, the Department of Finance published bail-in regulations under the Canada Deposit Insurance Corporation (CDIC) Act and the *Bank Act*. Under these regulations, 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. The regulations became effective September 23, 2018. These changes are not expected to have a material impact on our cost of long-term unsecured funding.

Total Loss Absorbing Capacity (TLAC)

On April 18, 2018, OSFI released its final guideline on 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 a G-SIB, but tailored to the Canadian context. The standards are 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.

On August 21, 2018, OSFI provided notification requiring systemically important banks to maintain a minimum of 23% (inclusive of the 1.5% DSB) of TLAC-eligible instruments relative to their RWAs and 6.75% relative to their leverage exposures. We are expected to comply with the minimum TLAC requirements by November 1, 2021 and to begin disclosing our TLAC ratios in the first quarter of 2019. We do not anticipate any challenges in meeting these TLAC requirements.

Revisions to the G-SIB Framework

On July 5, 2018, the BCBS published the *Global systemically important banks: revised assessment methodology and the higher loss absorbency requirement*, which includes revisions to the G-SIB framework. The objective of the G-SIB framework is to ensure G-SIBs hold higher capital buffers and provides incentives for such firms to reduce their systemic importance. Although core elements of the framework were maintained, the revisions include amendments to the definition of cross-jurisdictional indicators, the introduction of a trading volume indicator, extending the scope of consolidation to insurance subsidiaries, revised disclosure requirements, and further guidance on the higher loss absorbency requirements. We are currently assessing the impact of these amendments. The BCBS expects member jurisdictions to implement these revisions by 2021. OSFI has not yet released their expected implementation date.

Accounting and control matters

Critical accounting policies and estimates

Application of critical accounting policies, judgments, estimates and assumptions

Our significant accounting policies are described in Note 2 of our 2018 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 instrument and securities impairment (under IAS 39), 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 of 2018, we adopted IFRS 9 *Financial Instruments* (IFRS 9). As permitted by the transition provisions of IFRS 9, we elected not to restate comparative period results; accordingly, all comparative period information prior to November 1, 2017 is presented in accordance with our previous accounting policies. Adjustments to carrying amounts of financial assets and liabilities at November 1, 2017 were recognized in opening Retained earnings and Other components of equity in the first quarter of 2018. Refer to Note 2 of our Annual Consolidated Financial Statements for our previous accounting policies and details of these changes.

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 are one or more inputs that are unobservable and significant to the fair value of the asset or liability. Unobservable inputs are used to measure fair value to the extent that observable inputs are not available at the measurement date. The availability of inputs for valuation may affect the selection of valuation techniques. The classification of a financial instrument in the 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 – Policy applicable from November 1, 2017 (IFRS 9)
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.
- 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 revenue 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 2018 Annual Consolidated Financial Statements.

Securities impairment – Policy applicable prior to November 1, 2017 (IAS 39)
At each reporting date or more frequently when conditions warrant, we evaluate our AFS securities to determine whether there is any objective evidence of impairment, such as a significant or prolonged decline in the fair value of the security below its cost or when an adverse effect on future cash flows from the security can be reliably estimated. Evidence of impairment includes, but is not limited to, delinquency or default, bankruptcy, restructuring or other events that may question the issuer's creditworthiness. When assessing impairment for debt instruments we primarily consider counterparty ratings and security-specific factors, including collateral, external ratings, subordination and other market factors. For complex debt instruments including U.S. non-agency MBS, ABS and other structured products, we also use cash flow projection models which incorporate actual and projected cash flows for each security using a number of assumptions and inputs that are based on security specific factors. The inputs and assumptions used, such as default, prepayment and recovery rates, are based on updated market data. In addition, we consider the transaction structure and credit enhancement for structured securities. If results indicate that we will not be able to recover the entire principal and interest amount, we do a further review of the security in order to assess whether a loss would ultimately be realized. As equity securities do not have contractual cash flows, they are assessed differently than debt securities. When assessing equity securities for impairment, we consider factors that include the length of time and extent the fair value has been below cost and the financial condition and near term prospects of the issuer. We also consider the estimated recoverable value and the period of recovery. Refer to Note 4 of our 2018 Annual Consolidated Financial Statements for more information.

Allowance for credit losses – Policy applicable prior to November 1, 2017 (IAS 39)
We maintain an allowance for credit losses relating to on-balance sheet exposures, such as loans and acceptances, and off-balance sheet items such as letters of credit, guarantees and unfunded commitments, at levels that we consider appropriate to cover credit-related losses incurred as at the balance sheet date.

Loans which are individually significant are assessed individually for objective indicators of impairment. A loan is considered impaired when we determine that we will not be able to collect all amounts due according to the original contractual terms. Credit exposures of

individually significant loans are evaluated based on factors including the borrower's overall financial condition, resources and payment record, and where applicable, the realizable value of any collateral. If there is evidence of impairment leading to an impairment loss, then the amount of the loss is determined as the difference between the carrying value of the loan, including accrued interest, and the estimated recoverable amount. The estimated recoverable amount is measured as the present value of expected future cash flows discounted at the loan's original effective interest rate, including cash flows that may result from the realization of collateral less costs to sell.

Loans which are not individually significant, or which are individually assessed and not determined to be impaired, are collectively assessed for impairment. For the purposes of a collective evaluation of impairment, loans are grouped on the basis of similar credit risk characteristics, taking into account loan type, industry, geographic location, collateral type, past due status and other relevant factors. The collective impairment allowance is determined by reviewing factors including: (i) historical loss experience, which takes into consideration historical probabilities of default, loss given default and exposure at default, and (ii) management's judgment on the level of impairment losses based on historical experience relative to the actual level as reported at the balance sheet date, taking into consideration the current portfolio credit quality trends; business, economic and credit conditions; the impact of policy and process changes; and other supporting factors. Future cash flows for a group of loans are collectively evaluated for impairment on the basis of contractual cash flows and historical loss experience for loans with credit risk characteristics similar to those in the group. We use historical loss experience and normalize observable inputs for current and past conditions that are not relevant to the assessment performed for the current reporting period. The methodology and assumptions used for estimating future cash flows are reviewed regularly to reduce any differences between loss estimates and actual loss experience.

Loans and the related impairment allowance for credit losses are written off, either partially or in full, when there is no realistic prospect of recovery. Where loans are secured, they are generally written off after receipt of any proceeds from the realization of the collateral. In circumstances where the net realizable value of any collateral has been determined and there is no reasonable expectation of further recovery, write off may be earlier.

For further information on allowance for credit losses, refer to Note 5 of our 2018 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 other intangible assets with indefinite lives.

For further details, refer to Notes 2 and 10 to our 2018 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 16 of our 2018 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 2018 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 Note 2 and 6 of our 2018 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. We record provisions related to litigation, and asset retirement obligations and other items. Provisions are recorded under Other liabilities on our Consolidated Balance Sheets.

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. 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.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, such as an insurer, a separate asset is recognized if it is virtually certain that reimbursement will be received.

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. These assumptions are reviewed at least annually and updated in response to actual experience and market conditions. Liabilities for property and casualty insurance represent estimated provisions for reported and unreported claims. Liabilities for life and property and casualty insurance are included in Insurance claims and policy benefit liabilities. Changes in Insurance claims and policy benefit liabilities are included in the Insurance policyholder benefits, claims and acquisition expense in our Consolidated Statements of Income in the period in which the estimates change. Refer to Note 14 of our 2018 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 22 of our 2018 Annual Consolidated Financial Statements for further information.

Future changes in accounting policy and disclosure

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 15 *Revenue from Contracts with Customers* (IFRS 15)

In May 2014, the IASB issued IFRS 15, which establishes the principles for reporting about the nature, amount, timing and uncertainty of revenue and cash flows arising from an entity's contracts with customers. The standard provides a single, principles based five-step model for revenue recognition to be applied to contracts with customers except for revenue arising from items such as financial instruments, insurance contracts and leases. The majority of our revenue, including net interest income, is not expected to be impacted. We will adopt IFRS 15 by adjusting our Consolidated Balance Sheet at November 1, 2018, the date of initial application, with no restatement of comparative periods.

To manage our transition to IFRS 15, we implemented a comprehensive enterprise-wide program and governance structure led by Finance that focuses on key areas of impact, including financial reporting, systems and processes, training, as well as communications.

During fiscal 2018, we completed our assessment of the revenue contracts and the changes required to our applicable transition, interim and annual disclosures. The adoption of IFRS 15 is not expected to have a material impact on our Consolidated Financial Statements.

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 lessee accounting model that requires the recognition of lease assets and lease liabilities on the balance sheet for most leases. Lessees will also

recognize depreciation expense on the lease asset and interest expense on the lease liability in the statement of income. There are no significant changes to lessor accounting aside from enhanced disclosure requirements. IFRS 16 will be effective for us on November 1, 2019.

We plan to adopt IFRS 16 by adjusting our Consolidated Balance Sheet at November 1, 2019, the date of initial application, with no restatement of comparative periods.

Our transition to IFRS 16 includes a centralized enterprise-wide program and governance structure led by Finance to assess our existing lease portfolio and the impact on systems, processes, training, communication and financial reporting. In the upcoming year, we will finalize our assessment of our existing lease portfolio and changes required to our applicable transition, interim, and annual disclosures. We are currently assessing the impact of adopting this standard on our Consolidated Financial Statements.

As we prepare for our transition to IFRS 16, we will continue to monitor industry interpretations of the new standard and expect to adjust our implementation accordingly.

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. This new standard will be effective for us on November 1, 2021. In November 2018, the IASB tentatively decided to defer the IFRS 17 effective date by one year. We will continue to monitor the IASB's developments. We are currently assessing the impact of adopting this standard 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, 2018, 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, 2018.

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.

No changes were made in our internal control over financial reporting during the year ended October 31, 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. On November 1, 2017, we adopted IFRS 9 and have updated and modified certain internal controls over financial reporting as a result of the new accounting standard.

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 11 and 26 of our audited 2018 Annual Consolidated Financial Statements.

Supplementary information

Selected annual information — Table 73

(Millions of Canadian dollars, except as otherwise noted)	2018	2017	2016
Total revenue	$ 42,576	$ 40,669	$ 38,795
Net income attributable to:			
Shareholders	12,400	11,428	10,405
Non-controlling interest	31	41	53
	$ 12,431	$ 11,469	$ 10,458
Basic earnings per share (in dollars)	8.39	7.59	6.80
Diluted earnings per share (in dollars)	8.36	7.56	6.78
Dividends declared per common shares (in dollars)	3.77	3.48	3.24
Total assets	1,334,734	1,212,853	1,180,258
Deposits	837,046	789,635	757,589

Net interest income on average assets and liabilities — Table 74

(Millions of Canadian dollars, except for percentage amounts)	Average balances 2018	Average balances 2017	Average balances 2016	Interest 2018	Interest 2017	Interest 2016	Average rate 2018	Average rate 2017	Average rate 2016
Assets									
Deposits with other banks									
Canada	$ 10,300	$ 11,380	$ 11,679	$ 198	$ 146	$ 114	1.92%	1.28%	0.98%
U.S.	27,522	21,508	16,842	429	192	71	1.56	0.89	0.42
Other International	21,587	17,215	15,415	(61)	(31)	(18)	(0.28)	(0.18)	(0.12)
	59,409	50,103	43,936	566	307	167	0.95	0.61	0.38
Securities									
Trading	125,153	130,816	153,114	3,785	3,520	3,366	3.02	2.69	2.20
Investment, net of applicable allowance	90,470	83,787	72,440	1,885	1,379	1,227	2.08	1.65	1.69
	215,623	214,603	225,554	5,670	4,899	4,593	2.63	2.28	2.04
Asset purchased under reverse repurchase agreements and securities borrowed	266,709	205,993	191,243	5,536	3,021	1,816	2.08	1.47	0.95
Loans (1)									
Canada									
Retail	364,473	350,155	338,270	13,533	11,672	11,141	3.71	3.33	3.29
Wholesale	77,985	74,955	69,028	3,682	3,534	3,249	4.72	4.71	4.71
	442,458	425,110	407,298	17,215	15,206	14,390	3.89	3.58	3.53
U.S.	79,695	75,967	75,734	3,008	2,391	2,038	3.77	3.15	2.69
Other International	28,932	27,201	29,409	1,026	1,080	1,448	3.55	3.97	4.92
	551,085	528,278	512,441	21,249	18,677	17,876	3.86	3.54	3.49
Total interest-earning assets	1,092,826	998,977	973,174	33,021	26,904	24,452	3.02	2.69	2.51
Non-interest-bearing deposits with other banks	31,695	23,953	17,586	–	–	–	–	–	–
Customers' liability under acceptances	16,015	14,550	13,247	–	–	–	–	–	–
Other assets	154,395	149,114	172,393	–	–	–	–	–	–
Total assets	$ 1,294,900	$ 1,186,600	$ 1,176,400	$ 33,021	$ 26,904	$ 24,452	2.55%	2.27%	2.08%
Liabilities and shareholders' equity									
Deposits (2)									
Canada	$ 513,240	$ 498,134	$ 487,194	$ 7,718	$ 5,560	$ 4,714	1.50%	1.12%	0.97%
U.S.	98,651	79,354	83,001	1,313	640	413	1.33	0.81	0.50
Other International	78,145	70,028	67,365	572	364	340	0.73	0.52	0.50
	690,036	647,516	637,560	9,603	6,564	5,467	1.39	1.01	0.86
Obligations related to securities sold short	32,642	37,205	50,262	1,627	1,515	1,579	4.98	4.07	3.14
Obligations related to assets sold under repurchase agreements and securities loaned	184,934	128,831	110,231	3,261	1,396	629	1.76	1.08	0.57
Subordinated debentures	9,131	9,460	8,931	322	270	227	3.53	2.85	2.54
Other interest-bearing liabilities	15,352	14,839	15,437	17	19	19	0.11	0.13	0.12
Total interest-bearing liabilities	932,095	837,851	822,421	14,830	9,764	7,921	1.59	1.17	0.96
Non-interest-bearing deposits	129,696	122,800	112,071	–	–	–	–	–	–
Acceptances	16,030	14,549	13,248	–	–	–	–	–	–
Other liabilities	141,390	138,797	159,215	–	–	–	–	–	–
Total liabilities	$ 1,219,211	$ 1,113,997	$ 1,106,955	$ 14,830	$ 9,764	$ 7,921	1.22%	0.88%	0.72%
Equity	75,720	72,607	69,445	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total liabilities and shareholders' equity	$ 1,294,900	$ 1,186,600	$ 1,176,400	$ 14,830	$ 9,764	$ 7,921	1.15%	0.82%	0.67%
Net interest income and margin	$ 1,294,900	$ 1,186,600	$ 1,176,400	$ 18,191	$ 17,140	$ 16,531	1.40%	1.44%	1.41%
Net interest income and margin (average earning assets)									
Canada	$ 637,214	$ 595,790	$ 572,671	$ 13,076	$ 12,104	$ 11,694	2.05%	2.03%	2.04%
U.S.	275,895	243,276	246,065	3,616	3,469	3,241	1.31	1.43	1.32
Other International	179,717	159,912	154,438	1,499	1,567	1,596	0.83	0.98	1.03
Total	$ 1,092,826	$ 998,978	$ 973,174	$ 18,191	$ 17,140	$ 16,531	1.66%	1.72%	1.70%

(1) Interest income includes loan fees of $621 million (2017 – $561 million; 2016 – $573 million).

(2) Deposits include personal savings deposits with average balances of $182 billion (2017 – $178 billion; 2016 – $166 billion), interest expense of $0.8 billion (2017 – $0.5 billion; 2016 – $0.4 billion) and average rates of 0.4% (2017 – 0.3%; 2016 – 0.3%). Deposits also include term deposits with average balances of $390 billion (2017 – $353 billion; 2016 – $362 billion), interest expense of $7.1 billion (2017 – $5.0 billion; 2016 – $4.3 billion) and average rates of 1.83% (2017 – 1.42%; 2016 – 1.20%).

Change in net interest income — Table 75

(Millions of Canadian dollars)	2018 (1) vs. 2017 Increase (decrease) due to changes in Average volume (2)	2018 (1) vs. 2017 Increase (decrease) due to changes in Average rate (2)	2018 (1) vs. 2017 Net change	2017 vs. 2016 Increase (decrease) due to changes in Average volume (2)	2017 vs. 2016 Increase (decrease) due to changes in Average rate (2)	2017 vs. 2016 Net change
Assets						
Deposits with other banks						
Canada (3)	$ (14)	$ 66	$ 52	$ (3)	$ 35	$ 32
U.S. (3)	54	183	237	20	101	121
Other international (3)	(8)	(22)	(30)	(2)	(11)	(13)
Securities						
Trading	(152)	417	265	(490)	644	154
Investment, net of applicable allowance	110	396	506	192	(40)	152
Asset purchased under reverse repurchase agreements and securities borrowed	890	1,625	2,515	140	1,065	1,205
Loans						
Canada						
Retail	477	1,384	1,861	391	140	531
Wholesale	143	5	148	279	6	285
U.S.	117	500	617	6	347	353
Other international	70	(123)	(53)	(109)	(259)	(368)
Total interest income	$ 1,687	$ 4,431	$ 6,118	$ 424	$ 2,028	$ 2,452
Liabilities						
Deposits						
Canada	169	1,990	2,159	106	740	846
U.S.	156	517	673	(18)	245	227
Other international	42	166	208	13	11	24
Obligations related to securities sold short	(186)	298	112	(410)	346	(64)
Obligations related to assets sold under repurchase agreements and securities loaned	608	1,257	1,865	106	661	767
Subordinated debentures	(9)	61	52	13	30	43
Other interest-bearing liabilities	1	(3)	(2)	(1)	1	–
Total interest expense	$ 781	$ 4,286	$ 5,067	$ (191)	$ 2,034	$ 1,843
Net interest income	$ 906	$ 145	$ 1,051	$ 615	$ (6)	$ 609

(1) Insurance segment assets and liabilities are included in Other assets and Other liabilities, respectively.
(2) Volume/rate variance is allocated on the percentage relationships of changes in balances and changes in rates to the total net change in net interest income.
(3) Geographic classification for selected assets and liabilities is based on the domicile of the booking point of the subject assets and liabilities.

Loans and acceptances by geography — Table 76

As at October 31 (Millions of Canadian dollars)	2018	2017	2016	2015	2014
Canada					
Residential mortgages	$ 265,831	$ 255,799	$ 241,800	$ 229,987	$ 215,624
Personal	82,112	82,022	82,205	84,637	86,984
Credit cards	18,793	17,491	16,601	15,516	14,650
Small business	4,866	4,493	3,878	4,003	4,067
Retail	371,602	359,805	344,484	334,143	321,325
Business	112,447	88,453	76,266	71,246	64,643
Sovereign (1)	4,307	9,379	8,586	8,508	3,840
Bank	1,873	1,326	1,278	530	413
Wholesale	$ 118,627	$ 99,158	$ 86,130	$ 80,284	$ 68,896
	$ 490,229	$ 458,963	$ 430,614	$ 414,427	$ 390,221
U.S.					
Retail	21,033	18,100	17,134	5,484	4,686
Wholesale	59,476	55,037	59,349	34,702	23,639
	80,509	73,137	76,483	40,186	28,325
Other International					
Retail	6,817	7,265	7,852	8,556	8,258
Wholesale	17,837	21,870	21,733	24,536	21,881
	24,654	29,135	29,585	33,092	30,139
Total loans and acceptances	$ 595,392	$ 561,235	$ 536,682	$ 487,705	$ 448,685
Total allowance for credit losses	(2,933)	(2,159)	(2,235)	(2,029)	(1,994)
Total loans and acceptances, net of allowance for credit losses	$ 592,459	$ 559,076	$ 534,447	$ 485,676	$ 446,691

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

Loans and acceptances by portfolio and sector — Table 77

As at October 31 (Millions of Canadian dollars)	2018	2017	2016	2015	2014
Residential mortgages	$ 282,471	$ 270,348	$ 254,998	$ 233,975	$ 219,257
Personal	92,700	92,294	93,466	94,346	96,021
Credit cards	19,415	18,035	17,128	15,859	14,924
Small business	4,866	4,493	3,878	4,003	4,067
Retail	$ 399,452	$ 385,170	$ 369,470	$ 348,183	$ 334,269
Business					
Agriculture	8,312	7,380	6,515	6,057	5,694
Automotive	8,726	8,248	7,279	6,614	6,209
Consumer goods	12,012	11,387	10,052	7,146	7,172
Energy					
Oil & gas	6,027	6,743	6,259	7,691	5,849
Utilities	8,090	5,614	7,680	5,162	3,766
Financing products	7,938	6,556	8,840	10,093	3,670
Forest products	1,100	911	1,099	1,169	979
Health services	6,982	6,998	7,763	6,023	4,052
Holding and investments	8,883	8,803	7,195	6,935	6,865
Industrial products	7,509	5,581	5,508	4,725	4,665
Mining & metals	1,301	1,113	1,455	1,402	1,320
Non-bank financial services	16,157	10,744	8,408	6,428	5,688
Other services	16,908	14,757	11,582	8,834	8,322
Real estate & related	51,563	46,197	40,419	33,802	30,387
Technology & media	11,506	8,890	11,019	6,599	4,822
Transportation & environment	6,318	5,950	6,060	5,907	5,432
Other	5,551	4,570	7,568	3,248	3,695
Sovereign	5,884	11,362	10,581	9,887	4,628
Bank	5,173	4,261	1,930	1,800	1,201
Wholesale	$ 195,940	$ 176,065	$ 167,212	$ 139,522	$ 114,416
Total loans and acceptances	$ 595,392	$ 561,235	$ 536,682	$ 487,705	$ 448,685
Total allowance for credit losses	(2,933)	(2,159)	(2,235)	(2,029)	(1,994)
Total loans and acceptances, net of allowance for credit losses	$ 592,459	$ 559,076	$ 534,447	$ 485,676	$ 446,691

Gross impaired loans by portfolio and geography — Table 78

As at October 31 (Millions of Canadian dollars, except for percentage amounts)	IFRS 9 2018	IAS 39 2017	2016	2015	2014
Residential mortgages	$ 725	$ 634	$ 709	$ 646	$ 678
Personal	302	276	304	299	300
Small business	44	38	46	45	47
Retail	1,071	948	1,059	990	1,025
Business					
Agriculture	$ 29	$ 28	$ 43	$ 41	$ 40
Automotive	7	29	43	11	12
Consumer goods	68	105	165	130	108
Energy					
Oil and gas	231	315	1,264	156	6
Utilities	7	10	78	57	–
Financing products	78	107	111	109	–
Forest products	9	7	21	28	25
Health services	6	21	21	17	18
Holding and investments	10	27	72	185	132
Industrial products	42	34	43	45	48
Mining & metals	2	3	15	17	9
Non-bank financial services	20	32	3	1	3
Other services	140	157	109	69	99
Real estate & related	293	345	241	297	314
Technology & media	10	82	93	34	38
Transportation & environment	91	23	45	53	32
Other	48	47	57	43	66
Sovereign	–	–	–	–	–
Bank	–	–	2	2	2
Wholesale	1,091	1,372	2,426	1,295	952
Acquired credit-impaired loans	21	256	418	–	–
Total GIL (1) (2)	$ 2,183	$ 2,576	$ 3,903	$ 2,285	$ 1,977
Canada					
Residential mortgages	$ 431	$ 323	$ 368	$ 356	$ 388
Personal	248	198	228	223	224
Small business	44	38	46	45	47
Retail	723	559	642	624	659
Business					
Agriculture	29	22	34	39	36
Automotive	5	4	9	8	11
Consumer goods	47	45	91	65	70
Energy					
Oil & gas	39	13	57	39	4
Utilities	–	–	15	20	–
Financing products	–	–	–	–	–
Forest products	9	7	21	5	6
Health services	4	5	18	17	19
Holding and investments	3	3	5	3	3
Industrial products	31	25	39	39	41
Mining & metals	2	3	12	7	9
Non-bank financial services	19	29	–	–	1
Other services	48	48	49	51	67
Real estate & related	137	187	121	161	171
Technology & media	8	12	27	34	37
Transportation & environment	15	23	24	29	11
Other	–	–	–	(5)	1
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	396	426	522	512	487
Total	$ 1,119	$ 985	$ 1,164	$ 1,136	$ 1,146
U.S.					
Retail	$ 23	$ 59	$ 56	$ 10	$ 13
Wholesale	401	736	1,736	204	18
Total	$ 424	$ 795	$ 1,792	$ 214	$ 31
Other International					
Retail	$ 327	$ 345	$ 380	$ 356	$ 353
Wholesale	313	451	567	579	447
Total	$ 640	$ 796	$ 947	$ 935	$ 800
Total GIL (1) (2)	$ 2,183	$ 2,576	$ 3,903	$ 2,285	$ 1,977
Allowance for impaired loans (3)	(700)	(737)	(809)	(654)	(632)
Net impaired loans	$ 1,483	$ 1,839	$ 3,094	$ 1,631	$ 1,345
GIL as a % of loans and acceptances					
Residential mortgages	0.26%	0.23%	0.28%	0.28%	0.31%
Personal	0.33%	0.30%	0.33%	0.32%	0.31%
Small business	0.90%	0.85%	1.19%	1.13%	1.16%
Retail	0.27%	0.25%	0.29%	0.28%	0.31%
Wholesale	0.57%	0.92%	1.69%	0.93%	0.84%
Total	0.37%	0.46%	0.73%	0.47%	0.44%
Allowance on impaired loans as a % of GIL (3)	32.08%	28.61%	20.72%	28.64%	31.98%

(1) 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, resulting in an increase in GIL of $134 million. Past due loans greater than 90 days not included in impaired loans were $179 million in 2018 (2017 – $307 million; 2016 – $337 million; 2015 – $314 million; 2014 – $316 million). For further details, refer to Note 5 of our 2018 Annual Consolidated Financial Statements.

(2) Effective November 1, 2017, GIL excludes $229 million of ACI loans related to our acquisition of City National that have returned to performing status.

(3) 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 — Table 79

(Millions of Canadian dollars, except for percentage amounts)	IFRS 9 2018	IAS 39 2017	2016	2015	2014
Residential mortgages	$ 51	$ 56	$ 77	$ 47	$ 94
Personal	462	409	458	388	441
Credit cards	468	435	442	378	353
Small business	30	32	34	32	44
Retail	$ 1,011	$ 932	$ 1,011	$ 845	$ 932
Business					
Agriculture	$ 1	$ 2	$ 10	$ 9	$ 3
Automotive	5	14	13	3	2
Consumer goods	48	11	20	33	27
Energy					
Oil and gas	(1)	(27)	320	47	(5)
Utilities	1	5	16	9	32
Financing products	–	(19)	1	39	3
Forest products	5	4	4	6	7
Health services	4	10	4	–	–
Holding and investments	3	1	–	18	29
Industrial products	4	16	12	4	14
Mining & metals	–	(4)	7	8	2
Non-bank financial services	(2)	2	–	7	–
Other services	58	20	(5)	4	18
Real estate & related	11	115	36	29	58
Technology & media	(21)	13	8	5	14
Transportation & environment	37	–	(4)	8	2
Other	(6)	53	36	24	26
Sovereign	–	–	–	–	–
Bank	–	–	(3)	(1)	–
Wholesale	$ 147	$ 216	$ 475	$ 252	$ 232
Acquired credit-impaired loans	2	2	10	–	–
Total PCL on impaired loans (1)	$ 1,160	$ 1,150	$ 1,496	$ 1,097	$ 1,164
Canada					
Residential mortgages	$ 44	$ 33	$ 42	$ 27	$ 27
Personal	458	413	459	393	393
Credit cards	456	426	435	371	345
Small business	30	32	34	32	44
Retail	$ 988	$ 904	$ 970	$ 823	$ 809
Business					
Agriculture	1	–	10	9	4
Automotive	1	1	3	3	3
Consumer goods	21	11	19	21	25
Energy					
Oil & gas	2	(15)	99	22	(5)
Utilities	1	1	–	1	–
Financial products	–	–	–	–	–
Forest products	5	4	5	1	1
Health services	6	7	4	–	–
Holding and investments	–	–	–	–	–
Industrial products	3	13	10	7	14
Mining & metals	–	1	7	3	2
Non-bank financial services	(1)	2	–	–	–
Other services	25	21	14	–	6
Real estate & related	11	38	26	13	34
Technology & media	1	10	2	6	14
Transportation & environment	4	2	8	7	3
Other	–	(1)	6	23	22
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	$ 80	$ 95	$ 213	$ 116	$ 123
Total (1)	$ 1,068	$ 999	$ 1,183	$ 939	$ 932
U.S.					
Retail	4	3	1	1	2
Wholesale	64	117	227	40	40
	$ 68	$ 120	$ 228	$ 41	$ 42
Other International					
Retail	19	25	41	21	121
Wholesale	5	6	44	96	69
	$ 24	$ 31	$ 85	$ 117	$ 190
Total PCL on impaired loans (1)	$ 1,160	$ 1,150	$ 1,496	$ 1,097	$ 1,164
Total PCL on performing loans (2)	123	–	50	–	–
Total PCL on other financial assets	24				
Total PCL	$ 1,307	$ 1,150	$ 1,546	$ 1,097	$ 1,164
PCL – Loans as a % of average net loans and acceptances	0.23%	0.21%	0.29%	0.24%	0.27%
PCL on impaired loans as a % of average net loans and acceptances (1)	0.20%	0.21%	0.28%	0.24%	0.27%

(1) Effective November 1, 2017, represents Stage 3 PCL under IFRS 9 and PCL on impaired loans under IAS 39.
(2) 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 (1) by portfolio and geography — Table 80

(Millions of Canadian dollars, except percentage amounts)	IFRS 9 2018	IAS 39 2017	2016	2015	2014
Allowance on loans at beginning of year	$ 2,976	$ 2,326	$ 2,120	$ 2,085	$ 2,050
Provision for credit losses (1)	1,283	1,150	1,546	1,097	1,164
Write-offs by portfolio					
Residential mortgages	(51)	(53)	(42)	(64)	(30)
Personal	(552)	(543)	(556)	(494)	(565)
Credit cards	(599)	(565)	(564)	(497)	(466)
Small business	(35)	(38)	(40)	(40)	(47)
Retail	$ (1,237)	$ (1,199)	$ (1,202)	$ (1,095)	$ (1,108)
Business	$ (207)	$ (226)	$ (321)	$ (243)	$ (221)
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	$ (207)	$ (226)	$ (321)	$ (243)	$ (221)
Total write-offs by portfolio	$ (1,444)	$ (1,425)	$ (1,523)	$ (1,338)	$ (1,329)
Recoveries by portfolio					
Residential mortgages	$ 8	$ 8	$ 5	$ 7	$ 2
Personal	121	116	111	105	106
Credit cards	131	131	122	119	114
Small business	7	9	10	10	9
Retail	$ 267	$ 264	$ 248	$ 241	$ 231
Business	$ 65	$ 66	$ 38	$ 33	$ 32
Sovereign	–	–	–	–	–
Bank	–	–	–	1	–
Wholesale	$ 65	$ 66	$ 38	$ 34	$ 32
Total recoveries by portfolio	$ 332	$ 330	$ 286	$ 275	$ 263
Net write-offs	$ (1,112)	$ (1,095)	$ (1,237)	$ (1,063)	$ (1,066)
Adjustments (2)	(59)	(131)	(103)	1	(63)
Total allowance on loans at end of year	$ 3,088	$ 2,250	$ 2,326	$ 2,120	$ 2,085
Allowance against impaired loans (3)					
Canada					
Residential mortgages	$ 43	$ 31	$ 35	$ 27	$ 31
Personal	107	91	105	96	93
Small business	18	19	20	19	19
Retail	$ 168	$ 141	$ 160	$ 142	$ 143
Business					
Agriculture	$ 2	$ 3	$ 6	$ 5	$ 6
Automotive	4	4	4	4	4
Consumer goods	15	11	14	12	22
Energy					
Oil & gas	2	3	6	–	–
Utilities	–	–	–	1	–
Financing products	–	–	–	–	–
Forest products	5	3	5	3	3
Health services	6	6	6	6	6
Holding and investments	1	1	1	1	1
Industrial products	5	13	11	13	18
Mining and metals	1	4	4	1	1
Non-bank financial services	–	1	–	–	–
Other services	22	19	18	19	28
Real estate & related	15	36	23	28	48
Technology & media	10	11	10	12	17
Transportation & environment	4	8	11	7	5
Other	–	1	–	(1)	1
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	$ 92	$ 124	$ 119	$ 111	$ 160
	$ 260	$ 265	$ 279	$ 253	$ 303
U.S.					
Retail	$ 1	$ 1	$ 2	$ 1	$ 1
Wholesale	164	150	177	47	16
	$ 165	$ 151	$ 179	$ 48	$ 17
Other International					
Retail	$ 166	$ 168	$ 180	$ 169	$ 172
Wholesale	109	153	171	184	140
	$ 275	$ 321	$ 351	$ 353	$ 312
Total allowance on impaired loans (3)	$ 700	$ 737	$ 809	$ 654	$ 632
Allowance on performing loans (4)					
Residential mortgages	$ 206	$ 128	$ 96	$ 83	$ 78
Personal	754	391	385	396	400
Credit cards	760	379	386	386	385
Small business	33	37	45	45	45
Retail	$ 1,753	$ 935	$ 912	$ 910	$ 908
Wholesale	$ 635	$ 487	$ 514	$ 465	$ 454
Off-balance sheet and other items		$ 91	$ 91	$ 91	$ 91
Total allowance on performing loans (4)	$ 2,388	$ 1,513	$ 1,517	$ 1,466	$ 1,453
Total allowance on loans	$ 3,088	$ 2,250	$ 2,326	$ 2,120	$ 2,085
Key ratios					
Allowance on loans as a % of loans and acceptances	0.52%	0.40%	0.43%	0.43%	0.46%
Net write-offs as a % of average net loans and acceptances	0.20%	0.20%	0.23%	0.23%	0.25%

(1) Includes loans, acceptances, and commitments.

(2) Other adjustments include $77 million of unwind of discount and $(18) million of changes in exchange rate (2017 – $104 million and $27 million; 2016 – $100 million and $3 million; 2015 – $80 million and $(81) million). For further details, refer to Note 5 of our 2018 Annual Consolidated Financial Statements.

(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 81

(Millions of Canadian dollars)	IFRS 9	IAS 39			
	2018	2017	2016	2015	2014
Loans and acceptances					
Atlantic provinces (1)	**$ 25,305**	$ 24,471	$ 23,947	$ 23,040	$ 22,130
Quebec	**58,067**	56,749	53,518	51,197	50,748
Ontario	**225,606**	202,272	185,434	175,315	159,817
Alberta	**69,497**	68,051	66,277	64,902	61,197
Other Prairie provinces (2)	**32,101**	31,318	30,143	29,490	27,341
B.C. and territories (3)	**79,653**	76,102	71,295	70,483	68,988
Total loans and acceptances in Canada	**$ 490,229**	$ 458,963	$ 430,614	$ 414,427	$ 390,221
Gross impaired loans (4)					
Atlantic provinces (1)	**$ 89**	$ 77	$ 101	$ 93	$ 81
Quebec	**185**	176	207	213	205
Ontario	**227**	213	336	341	391
Alberta	**335**	284	313	224	185
Other Prairie provinces (2)	**176**	125	93	115	73
B.C. and territories (3)	**107**	110	114	150	211
Total GIL in Canada	**$ 1,119**	$ 985	$ 1,164	$ 1,136	$ 1,146
Provision for credit losses on impaired loans (5)					
Atlantic provinces (1)	**$ 59**	$ 66	$ 67	$ 57	$ 51
Quebec	**94**	85	92	96	92
Ontario	**678**	617	654	590	588
Alberta	**116**	112	226	77	71
Other Prairie provinces (2)	**68**	64	64	52	40
B.C. and territories (3)	**53**	55	80	67	90
Total PCL on impaired loans in Canada	**$ 1,068**	$ 999	$ 1,183	$ 939	$ 932

(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 2018 Annual Report and Supplementary Financial Information package (SFI), in accordance with recommendations from the FSB's Enhanced Disclosure Task Force (EDTF).

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	112	1
	2	Define risk terminology and measures	50, 52-55, 213-214	–
	3	Top and emerging risks	50-51	–
	4	New regulatory ratios	91-93	–
Risk governance, risk management and business model	5	Risk management organization	50, 52-55	–
	6	Risk culture	52-55	–
	7	Risk in the context of our business activities	98	–
	8	Stress testing	53-54 67	–
Capital adequacy and risk-weighted assets (RWA)	9	Minimum Basel III capital ratios and Domestic systemically important bank surcharge	91-93	–
	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	90-93	–
	13	RWA by business segments	–	26
	14	Analysis of capital requirement, and related measurement model information	56-59	25,*
	15	RWA credit risk and related risk measurements	–	*
	16	Movement of risk-weighted assets by risk type	–	26
	17	Basel back-testing	53, 56-57	41
Liquidity	18	Quantitative and qualitative analysis of our liquidity reserve	73-75 79-80	–
Funding	19	Encumbered and unencumbered assets by balance sheet category, and contractual obligations for rating downgrades	75, 78	–
	20	Maturity analysis of consolidated total assets, liabilities and off-balance sheet commitments analyzed by remaining contractual maturity at the balance sheet date	80-81	–
	21	Sources of funding and funding strategy	75-77	–
Market risk	22	Relationship between the market risk measures for trading and non-trading portfolios and the balance sheet	71-72	–
	23	Decomposition of market risk factors	67-70	–
	24	Market risk validation and back-testing	67	–
	25	Primary risk management techniques beyond reported risk measures and parameters	67-70	–
Credit risk	26	Bank's credit risk profile	56-66 159-165	29-41,*
		Quantitative summary of aggregate credit risk exposures that reconciles to the balance sheet	106-111	39
	27	Policies for identifying impaired loans	57-59, 101-102, 123-126, 128-129	–
	28	Reconciliation of the opening and closing balances of impaired loans and impairment allowances during the year	–	31, 36
	29	Quantification of gross notional exposure for OTC derivatives or exchange-traded derivatives	60	43
	30	Credit risk mitigation, including collateral held for all sources of credit risk	59	40
Other	31	Other risk types	83-90	–
	32	Publicly known risk events	86-87, 202-203	–

* In accordance with the BCBS' Revised Pillar 3 Disclosure Requirements we have published our first standalone Pillar 3 Report for the year ended October 31, 2018. As a result these disclosure requirements are satisfied or partially satisfied by disclosures provided in our Pillar 3 Report.