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, 2016, compared to the preceding two fiscal years. This MD&A should be read in conjunction with our 2016 Annual Consolidated Financial Statements and related notes and is dated November 29, 2016. 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 2016 Annual Information Form, is available free of charge on our website at rbc.com/investorrelations, on the Canadian Securities Administrators' website at sedar.com and on the EDGAR section of the United States (U.S.) Securities and Exchange Commission's (SEC) website at sec.gov.

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

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See our Glossary for definitions of terms used throughout this document.

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 2016 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 and market review and outlook for Canadian, U.S., European and global economies, the regulatory environment in which we operate, the outlook and priorities for each of our business segments, and the risk environment including our liquidity and funding risk. 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 management and Overview of other risks sections of our 2016 Annual Report; global uncertainty, the Brexit vote to have the United Kingdom leave the European Union, weak oil and gas prices, cyber risk, anti-money laundering, exposure to more volatile sectors, technological innovation and new Fintech entrants, increasing complexity of regulation, data management, litigation and administrative penalties; 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 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 2016 Annual Report are set out in the Overview and outlook section and for each business segment under the heading Outlook and priorities. 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 management and Overview of other risks sections of our 2016 Annual Report.

Selected financial and other highlights

Table 1

(Millions of Canadian dollars, except per share, number of and percentage amounts)	2016	2015	2014	2016 vs. 2015 Increase (decrease)	
Total revenue	$ 38,405	$ 35,321	$ 34,108	$ 3,084	8.7%
Provision for credit losses (PCL)	1,546	1,097	1,164	449	40.9%
Insurance policyholder benefits, claims and acquisition expense (PBCAE)	3,424	2,963	3,573	461	15.6%
Non-interest expense	20,136	18,638	17,661	1,498	8.0%
Income before income taxes	13,299	12,623	11,710	676	5.4%
Net income	$ 10,458	$ 10,026	$ 9,004	$ 432	4.3%
Segments – net income					
Personal & Commercial Banking	$ 5,184	$ 5,006	$ 4,475	$ 178	3.6%
Wealth Management	1,473	1,041	1,083	432	41.5%
Insurance	900	706	781	194	27.5%
Investor & Treasury Services	613	556	441	57	10.3%
Capital Markets	2,270	2,319	2,055	(49)	(2.1)%
Corporate Support	18	398	169	(380)	(95.5)%
Net income	$ 10,458	$ 10,026	$ 9,004	$ 432	4.3%
Selected information					
Earnings per share (EPS) – basic	$ 6.80	$ 6.75	$ 6.03	$ 0.05	0.7%
– diluted	6.78	6.73	6.00	0.05	0.7%
Return on common equity (ROE) (1), (2)	16.3%	18.6%	19.0%	n.m.	(230) bps
Average common equity (1)	$ 62,200	$ 52,300	$ 45,700	$ 9,900	18.9%
Net interest margin (on average earning assets) (3)	1.70%	1.71%	1.86%	n.m.	(1) bps
Total PCL as a % of average net loans and acceptances	0.29%	0.24%	0.27%	n.m.	5 bps
PCL on impaired loans as a % of average net loans and acceptances	0.28%	0.24%	0.27%	n.m.	4 bps
Gross impaired loans (GIL) as a % of loans and acceptances (4)	0.73%	0.47%	0.44%	n.m.	26 bps
Liquidity coverage ratio (LCR) (5)	127%	127%	n.a.	n.m.	– bps
Capital ratios, Leverage ratio and multiples					
Common Equity Tier 1 (CET1) ratio (6)	10.8%	10.6%	9.9%	n.m.	20 bps
Tier 1 capital ratio (6)	12.3%	12.2%	11.4%	n.m.	10 bps
Total capital ratio (6)	14.4%	14.0%	13.4%	n.m.	40 bps
Assets-to-capital multiple (6)	n.a.	n.a.	17.0X	n.a.	n.a.
Leverage ratio (6)	4.4%	4.3%	n.a.	n.m.	10 bps
Selected balance sheet and other information (7)					
Total assets	$ 1,180,258	$ 1,074,208	$ 940,550	$ 106,050	9.9%
Securities	236,093	215,508	199,148	20,585	9.6%
Loans (net of allowance for loan losses)	521,604	472,223	435,229	49,381	10.5%
Derivative related assets	118,944	105,626	87,402	13,318	12.6%
Deposits	757,589	697,227	614,100	60,362	8.7%
Common equity	64,304	57,048	48,615	7,256	12.7%
Total capital risk-weighted assets	449,712	413,957	372,050	35,755	8.6%
Assets under management (AUM)	586,300	498,400	457,000	87,900	17.6%
Assets under administration (AUA) (8)	5,058,900	4,683,100	4,710,900	375,800	8.0%
Common share information					
Shares outstanding (000s) – average basic	1,485,876	1,442,935	1,442,553	42,941	3.0%
– average diluted	1,494,137	1,449,509	1,452,003	44,628	3.1%
– end of period	1,485,394	1,443,423	1,442,233	41,971	2.9%
Dividends declared per common share	$ 3.24	$ 3.08	$ 2.84	$ 0.16	5.2%
Dividend yield (9)	4.3%	4.1%	3.8%	n.m.	20 bps
Common share price (RY on TSX) (10)	$ 83.80	$ 74.77	$ 80.01	$ 9.03	12.1%
Market capitalization (TSX) (10)	124,476	107,925	115,393	16,551	15.3%
Business information (number of)					
Employees (full-time equivalent) (FTE)	75,510	72,839	73,498	2,671	3.7%
Bank branches	1,419	1,355	1,366	64	4.7%
Automated teller machines (ATMs)	4,905	4,816	4,929	89	1.8%
Period average US$ equivalent of C$1.00 (11)	$ 0.755	$ 0.797	$ 0.914	$ (0.042)	(5.3)%
Period-end US$ equivalent of C$1.00	$ 0.746	$ 0.765	$ 0.887	$ (0.019)	(2.5)%

(1) Average amounts are calculated using methods intended to approximate the average of the daily balances for the period. This includes Average common equity used in the calculation of ROE. For further details, refer to the Key performance and non-GAAP measures section.
(2) These measures may not have a standardized meaning under generally accepted accounting principles (GAAP) and may not be comparable to similar measures disclosed by other financial institutions. For further details, refer to the Key performance and non-GAAP measures section.
(3) Net interest margin (on average earning assets) is calculated as net interest income divided by average earning assets. Average amounts are calculated using methods intended to approximate the average of the daily balances for the period.
(4) GIL includes $418 million (2015 – $nil) related to the acquired credit impaired (ACI) loans portfolio from our acquisition of City National, with over 80% covered by loss-sharing agreements with the Federal Deposit Insurance Corporation (FDIC). ACI loans added 8 bps to our 2016 GIL ratio (2015 – n.a.). For further details, refer to Notes 2 and 5 of our 2016 Annual Consolidated Financial Statements.
(5) LCR is a new regulatory measure under the Basel III Framework, and is calculated using the Liquidity Adequacy Requirements (LAR) guideline. Effective in the second quarter of 2015, LCR was adopted prospectively. For further details, refer to the Liquidity and funding risk section.
(6) Capital and Leverage ratios presented above are on an "all-in" basis. Effective the first quarter of 2015, the Leverage ratio has replaced the Assets-to-capital multiple (ACM). The Leverage ratio is a regulatory measure under the Basel III framework. The ACM is presented on a transitional basis for prior periods. For further details, refer to the Capital management section.
(7) Represents period-end spot balances.
(8) AUA includes $18.6 billion and $9.6 billion (2015 – $21.0 billion and $8.0 billion; 2014 – $23.2 billion and $8.0 billion) of securitized residential mortgages and credit card loans, respectively. Prior period figures have been revised from those previously disclosed.
(9) Defined as dividends per common share divided by the average of the high and low share price in the relevant period.
(10) Based on TSX closing market price at period-end.
(11) Average amounts are calculated using month-end spot rates for the period.
n.a. not applicable
n.m. not meaningful

About Royal Bank of Canada

Royal Bank of Canada is Canada's largest bank, and one of the largest banks in the world, based on market capitalization. We are one of North America's leading diversified financial services companies, and provide personal and commercial banking, wealth management, insurance, investor services and capital markets products and services on a global basis. We have over 80,000 full- and part-time employees who serve more than 16 million personal, business, public sector and institutional clients through offices in Canada, the U.S. and 36 other countries. For more information, please visit rbc.com.

Our business segments are described below.

Personal & Commercial Banking operates in Canada, the Caribbean and the U.S., and comprises our personal and business banking operations, as well as our auto financing and retail investment businesses.

Wealth Management serves affluent, high net worth and ultra-high net worth clients from our offices in key financial centres mainly in Canada, the U.S., the U.K., the Channel Islands and Asia with a comprehensive suite of investment, trust, banking, credit and other wealth management solutions. We also provide asset management products and services directly to institutional and individual clients through our distribution channels and third-party distributors.

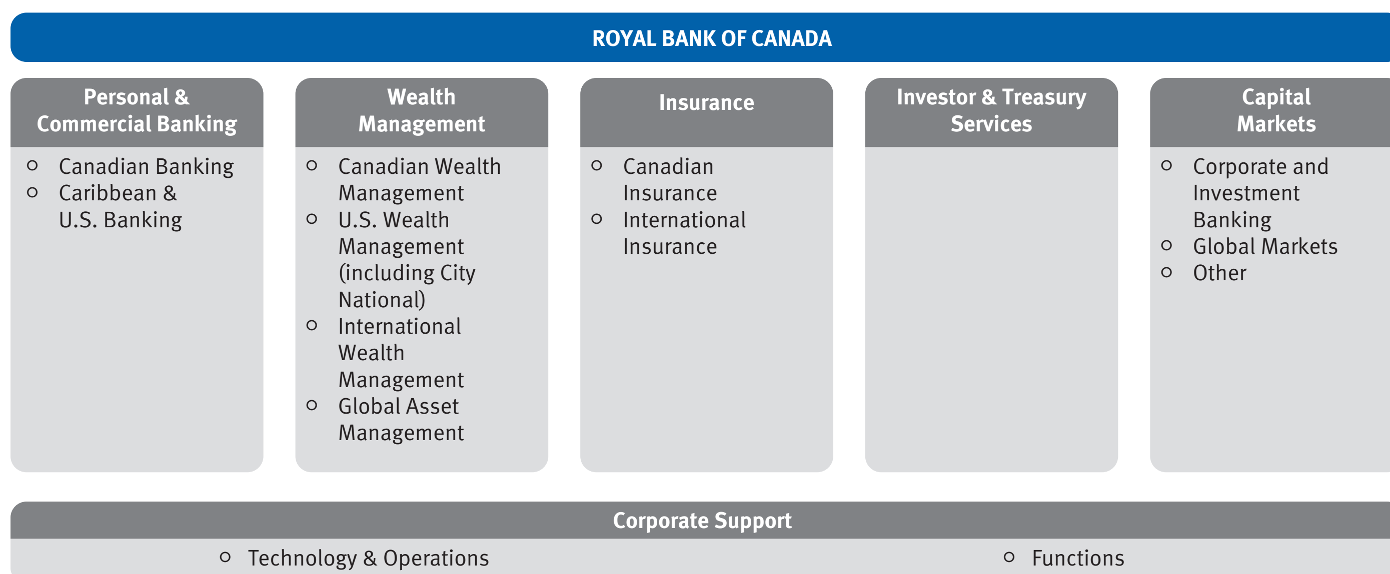
Insurance provides a wide range of life, health, home, auto, travel, wealth, group and reinsurance products and solutions. In Canada, we offer insurance products and services through our proprietary distribution channels, comprised of the field sales force which includes retail insurance branches, our field sales representatives, advice centres and online, as well as through independent insurance advisors and affinity relationships. Outside Canada, we operate in reinsurance markets globally offering life, accident and annuity reinsurance products.

Investor & Treasury Services serves the needs of institutional investing clients by providing asset services, custodial, advisory, financing and other services to safeguard assets, maximize liquidity and manage risk in multiple jurisdictions around the world. We also provide short-term funding and liquidity management for RBC.

Capital Markets provides public and private companies, institutional investors, governments and central banks with a wide range of products and services. In North America, we offer a full suite of products and services which include corporate and investment banking, equity and debt origination and distribution, and structuring and trading. Outside North America, we offer a diversified set of capabilities in our key sectors of expertise such as energy, mining and infrastructure, and we have expanded into industrial, consumer and healthcare in Europe.

Our business segments are supported by Corporate Support, which consists of Technology & Operations and Functions. Technology & Operations provides the technological and operational foundation required to effectively deliver products and services to our clients, while Functions includes our finance, human resources, risk management, internal audit and other functional groups.

The following chart presents our business segments and respective lines of business:



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 2016 against our business strategies and strategic goals, refer to the Business segment results section.

Economic, market and regulatory review and outlook – data as at November 29, 2016

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

Canada

The Canadian economy is expected to grow by 1.3%[1] during calendar 2016, which is below our estimate of 2.2%[1] as at December 1, 2015 and consistent with our estimate as at August 23, 2016. Growth over the first half of the calendar year was supported by solid consumer spending and housing activity, reflecting low interest rates and a resilient labour market. Business investment remained weak as firms in the energy sector continued to reduce capital spending. Weakness in the energy sector was compounded by wildfires in Alberta that resulted in temporary shutdowns by oil and gas producers, destroyed over 2,000 buildings and displaced 80,000 individuals. The economy has rebounded in the second half of the year as oil and gas production normalized and non-energy exports recovered from earlier weakness. The unemployment rate rose to 7.0%, slightly higher than July's rate of 6.9% as labour force participation increased. The Bank of Canada (BoC) has held the overnight rate steady in calendar 2016 amid persistent slack in the economy, due to slower-than-expected growth in non-energy industries, as well as inflation results that were below target.

In calendar 2017, we expect the Canadian economy will grow at a 1.8%[1] rate, driven by firm consumer spending, fiscal stimulus, stronger export growth and a modest recovery in business investment. Due to federal and provincial policy changes announced in 2016, we expect housing market activity will soften in calendar 2017. The BoC has maintained a cautious tone recently amid uncertainty surrounding the economic outlook; however, we expect the overnight rate will be held steady throughout 2017 as growth moves in line with the BoC's latest projection.

U.S.

The U.S. economy is expected to grow by 1.6%[1] in calendar 2016, which is below our estimate of 2.8%[1] as at December 1, 2015 and slightly above our estimate of 1.5%[1] as at August 23, 2016. Consumer spending growth was strong over the first half of the year, reflecting solid job growth, rising wages, elevated consumer confidence and low interest rates. However, declining inventory investment and a reduction in business investment, partially reflecting further weakness in the energy sector, had an adverse impact on growth earlier this year. The unemployment rate of 4.9% has been relatively stable this year amid rising labour force participation, falling within the range that the Federal Reserve (Fed) views as consistent with full employment. The Fed has noted that the case for higher rates continues to strengthen with growth having rebounded in the second half of the year and inflation picking up gradually. Barring an extended period of market volatility following the recent U.S. election result, we expect the Fed will raise the federal funds target range to 0.50%-0.75% in December from its current range of 0.25%-0.50%.

In calendar 2017, we expect the U.S. economy will grow at a 2.2%[1] rate as consumer spending growth remains firm and business investment picks up in both energy and non-energy industries. As growth continues at a solid pace, the labour market improves further and inflation rises toward the Fed's 2% target, we expect the gradual withdrawal of monetary policy stimulus to continue, with the Fed raising rates by another 50 basis points in calendar 2017. The recent U.S. election could result in policy changes that impact the economic outlook though any revisions to our expectations await further details being announced by the new administration.

Europe

The Eurozone economy is expected to grow by 1.6% in calendar 2016, which is below our estimate of 1.7% as at December 1, 2015, but slightly above our estimate of 1.5% as at August 23, 2016. The steady economic recovery has continued over the last year and the threat of deflation has subsided, although inflation remains well below the European Central Bank's (ECB) target. Growth has been driven by consumer spending and business investment, reflecting a gradually improving labour market and rising business sentiment. The unemployment rate of 10.0% in September matched the lowest level since July 2011. The ECB left monetary policy unchanged in October, awaiting the results of a review of its asset purchase program that will be available in December.

In calendar 2017, we expect the Eurozone economy will grow by 1.3% as political uncertainty, including evolving Brexit negotiations, weighs on business sentiment. We expect the ECB will continue to provide substantial monetary policy stimulus with monthly asset purchases likely to be extended beyond March 2017.

Financial markets

Global equity markets recorded minimal gains this year amid several periods of heightened volatility related to global growth concerns and political uncertainty related to Brexit and the U.S. election. Central banks have maintained highly stimulative monetary policy and some governments are increasing fiscal stimulus. Yields on Canadian and U.S. long-term government bonds generally declined over the first half of the year but increased more recently as inflation expectations rose. Oil prices hit year-to-date highs of around $50/barrel in October but declined more recently on concerns that the Organization of the Petroleum Exporting Countries (OPEC) would have difficulty reaching a consensus to cap output.

The macroeconomic headwinds discussed above, such as the volatility of oil prices, the potential for greater uncertainty or financial market instability related to Brexit and the U.S. election, and greater global economic uncertainty may alter our outlook and results for fiscal 2017 and future periods. These continuing pressures may lead to higher PCL in our wholesale and retail loan portfolios and impact the general business and economic conditions in the regions we operate.

Regulatory environment

We continue to monitor and prepare for regulatory developments in a manner that seeks to ensure compliance with new requirements while mitigating any adverse business or economic impacts. Such impacts could result from new or amended regulations and the expectations of those who enforce them. Significant developments include continuing changes to global and domestic standards for capital and liquidity, over-the-counter (OTC) derivatives reform, initiatives to enhance requirements for institutions deemed systemically important to the financial sector, and changes to resolution regimes addressing government bail-in and total loss-absorbing capacity. We also continue to implement reforms enacted under the U.S. *Dodd-Frank Wall Street Reform and Consumer Protection Act* including those related to the Fed's enhanced prudential standards for Bank Holding Companies and Foreign Banking Organizations.

For a discussion on risk factors resulting from these and other regulatory developments which may affect our business and financial results, refer to the Risk management – Top and emerging risks section. For further details on our framework and activities to manage risks, refer to the Risk management and Capital management sections.

1 Annualized rate

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

Financial performance objectives are used to measure 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 2016 performance against our medium-term financial performance objectives:

2016 Financial performance compared to our medium-term objectives — Table 2

	2016 results
Diluted EPS growth of 7% +	0.7%
ROE of 18% +	16.3%
Strong capital ratios (CET1) (1)	10.8%
Dividend payout ratio 40% – 50%	48%

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

Both our diluted EPS and ROE were impacted by our acquisition of City National due to the issuance of RBC common shares, as noted below.

For 2017, we maintained our financial performance objectives relating to diluted EPS growth, strong capital ratios and dividend payout ratio. We have revised our ROE financial objective to 16%+ to reflect higher ongoing regulatory capital requirements and the impact related to the issuance of RBC common shares on the acquisition of City National.

We compare our TSR to that of a global peer group approved by our Board of Directors. 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 annualized TSR vs. peer group average — Table 3

	Three year TSR (1)	Five year TSR (1)
Royal Bank of Canada	10% Top half	16% Top half
Peer group average (excluding RBC)	8%	13%

(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, 2013 to October 31, 2016 and October 31, 2011 to October 31, 2016, respectively.

Common share and dividend information — Table 4

For the year ended October 31	2016	2015	2014	2013	2012
Common share price (RY on TSX) – close, end of period	$ 83.80	$ 74.77	$ 80.01	$ 70.02	$ 56.94
Dividends paid per share	3.20	3.04	2.76	2.46	2.22
Increase (decrease) in share price	12.1%	(6.5)%	14.3%	23.0%	17.1%
Total shareholder return	16.8%	(3.0)%	19.0%	28.0%	22.0%

Key corporate events of 2016

RBC General Insurance Company

On July 1, 2016, we completed the sale of RBC General Insurance Company to Aviva Canada Inc. (Aviva), which was previously announced on January 21, 2016. The transaction involved the sale of our home and auto insurance manufacturing business and included a 15-year strategic distribution agreement between RBC Insurance and Aviva. As a result of the transaction, we recorded a gain of $287 million ($235 million after-tax) in our 2016 results, which was recorded in Non-interest income – Other. For further details, refer to Note 11 of our 2016 Annual Consolidated Financial Statements.

City National Corporation

On November 2, 2015, we completed the acquisition of City National Corporation (City National), the holding company for City National Bank. Total consideration of $7.1 billion (US$5.5 billion) was paid with $3.4 billion (US$2.6 billion) in cash, 41.6 million RBC common shares and $360 million (US$275 million) of RBC first preferred shares. City National has been combined with the U.S. Wealth Management business within our Wealth Management segment. For further details, refer to Note 11 of our 2016 Annual Consolidated Financial Statements.

Financial performance

Overview

2016 vs. 2015

Net income of $10,458 million was up $432 million or 4% from a year ago. Diluted earnings per share (EPS) of $6.78 was up $0.05 and return on common equity (ROE) of 16.3% was down 230 bps from 18.6% last year. In 2016, both our diluted EPS and ROE were impacted by our acquisition of City National due to the issuance of RBC common shares as noted above. Our Common Equity Tier 1 (CET1) ratio was 10.8%, up 20 bps.

Our results were driven by higher earnings in Wealth Management, Insurance, Personal & Commercial Banking, and Investor & Treasury Services, partially offset by lower earnings in Capital Markets. Our results include the after-tax gain of $235 million on the sale of RBC General Insurance Company to Aviva and the favourable impact of foreign exchange translation. Results in 2015 included a gain of $108 million (before- and after-tax) from the wind-up of a U.S.-based subsidiary that resulted in the release of foreign currency translation adjustment (CTA) which was recorded in Corporate Support.

Wealth Management earnings increased primarily reflecting the inclusion of our acquisition of City National, which contributed $290 million to earnings, lower restructuring costs relating to the International Wealth Management business, and benefits from our efficiency management activities. These factors were partially offset by lower transaction volumes.

Insurance earnings increased largely due to the gain on the sale of RBC General Insurance Company, as noted above. Lower earnings from new U.K. annuity contracts and the reduction in earnings from the sale of our home and auto insurance manufacturing business, as noted above, were partially offset by growth in International Insurance.

Personal & Commercial Banking earnings increased largely reflecting solid volume and fee-based revenue growth across most businesses in Canada, and higher earnings in the Caribbean. These factors were partially offset by lower spreads, higher costs in support of business growth and higher PCL in Canada.

Investor & Treasury Services earnings increased primarily due to higher funding and liquidity earnings reflecting tightening credit spreads and favourable interest rate movements, and higher client deposit spreads. These factors were partially offset by increased investment in technology initiatives, higher staff costs and lower earnings from foreign exchange market execution. In addition, the prior year included an additional month of earnings in Investor Services of $42 million ($28 million after-tax).

Capital Markets earnings decreased largely driven by higher PCL, lower results in our Global Markets and Corporate and Investment Banking businesses reflecting lower client activity, and higher compliance costs. These factors were partially offset by lower variable compensation, the impact from foreign exchange translation, and lower litigation provisions.

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

2015 vs. 2014

In 2015, net income of $10,026 million was up $1,022 million or 11% from 2014. Diluted EPS of $6.73 was up $0.73 and ROE of 18.6% was down 40 bps. Our CET1 ratio was 10.6%, up 70 bps.

Our results were driven by higher earnings in Personal & Commercial Banking, Capital Markets and Investor & Treasury Services, partially offset by lower earnings in Insurance and Wealth Management. Our results were also favourably impacted by a lower effective tax rate reflecting favourable income tax adjustments, the positive impact of foreign exchange translation, and a gain of $108 million (before- and after-tax) from the wind-up of a U.S.-based funding subsidiary as noted above. In addition, results in 2014 included a loss of $100 million (before- and after-tax) related to the sale of RBC Royal Bank (Jamaica) Limited (RBC Jamaica) and a provision of $40 million ($32 million after-tax) related to post-employment benefits and restructuring charges in the Caribbean.

Personal & Commercial Banking earnings mainly reflected solid volume growth across most businesses in Canada, strong fee-based revenue growth, and higher earnings in the Caribbean, partially offset by higher costs to support business growth and lower spreads.

Capital Markets earnings were driven by growth in our Global Markets business mainly reflecting increased client activity, continued solid performance in our Corporate and Investment Banking business, and the impact from foreign exchange translation, partially offset by lower results in certain legacy portfolios.

Investor & Treasury Services earnings mainly reflected higher earnings from foreign exchange market execution, an additional month of earnings in Investor Services of $42 million ($28 million after-tax), increased custodial fees, and higher earnings from growth in client deposits. These factors were partially offset by lower funding and liquidity results.

Insurance results decreased mainly due to a change in Canadian tax legislation impacting certain foreign affiliates which became effective November 1, 2014, a lower level of favourable actuarial adjustments, and higher net claims costs. These factors were partially offset by higher earnings from new U.K. annuity contracts, and a favourable impact of investment-related activities on the Canadian life business.

Wealth Management earnings decreased primarily reflecting higher costs in support of business growth in our Global Asset Management and Canadian Wealth Management businesses, restructuring costs of $122 million ($90 million after-tax) largely related to our International Wealth Management business, lower transaction volumes and higher PCL. These factors were partly offset by higher earnings from growth in average fee-based client assets.

Impact of foreign currency translation

Our foreign currency-denominated results are impacted by exchange rate fluctuations. Revenue, PCL, insurance policyholder benefits, claims and acquisition expense (PBCAE), non-interest expense and net income denominated in foreign currency are translated at the average rate of exchange for the period.

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)	2016 vs. 2015	2015 vs. 2014
Increase (decrease):		
Total revenue	$ 338	$ 1,012
PCL	20	11
PBCAE	(39)	75
Non-interest expense	165	652
Income taxes	64	113
Net income	128	161
Impact on EPS		
Basic	$ 0.09	$ 0.11
Diluted	0.09	0.11

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)	2016	2015	2014
U.S. dollar	0.755	0.797	0.914
British pound	0.544	0.519	0.551
Euro	0.683	0.707	0.680

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

Total revenue

Table 7

(Millions of Canadian dollars, except percentage amounts)	2016	2015	2014
Interest income	$ 24,452	$ 22,729	$ 22,019
Interest expense	7,921	7,958	7,903
Net interest income	$ 16,531	$ 14,771	$ 14,116
Net interest margin (on average earning assets)	1.70%	1.71%	1.86%
Investments (1)	$ 8,556	$ 8,095	$ 7,355
Insurance (2)	4,868	4,436	4,957
Trading (see additional trading information section)	701	552	742
Banking (3)	4,848	4,388	4,090
Underwriting and other advisory	1,876	1,885	1,809
Other (4)	1,025	1,194	1,039
Non-interest income	$ 21,874	$ 20,550	$ 19,992
Total revenue	$ 38,405	$ 35,321	$ 34,108

(1) Includes securities brokerage commissions, investment management and custodial fees, and mutual fund revenue.
(2) Includes premiums and investment and fee income. Investment income includes the change in fair value of investments backing policyholder liabilities and is largely offset in PBCAE.
(3) Includes service charges, foreign exchange revenue other than trading, card service revenue and credit fees.
(4) Includes other non-interest income, net gain (loss) on available-for-sale (AFS) securities and share of profit in joint ventures and associates.

2016 vs. 2015

Total revenue increased $3,084 million or 9% from last year. The impact of foreign exchange translation this year increased our total revenue by $338 million.

Net interest income increased $1,760 million or 12%, mainly due to the inclusion of our acquisition of City National, and volume growth of 6% across most of our businesses in Canadian Banking.

Net interest margin was down 1 bp compared to last year, largely due to the continued low interest rate environment and competitive pressures.

Investments revenue increased $461 million or 6%, mainly due to the inclusion of our acquisition of City National and higher average fee-based client assets reflecting net sales and capital appreciation. These factors were partially offset by lower transaction volumes.

Insurance revenue increased $432 million or 10%, mainly reflecting the change in fair value of investments backing our policyholder liabilities resulting from changes in long-term interest rates, largely offset in PBCAE. This was partially offset by lower premiums reflecting the impact of the sale of our home and auto insurance manufacturing business.

Banking revenue increased $460 million or 10% mainly due to the change in fair value of certain Canadian dollar-denominated available-for-sale (AFS) securities that were funded with U.S. dollar-denominated deposits which is offset in Other revenue, and increased client activity.

Underwriting and other advisory revenue decreased $9 million, largely reflecting lower debt and equity origination activity and decreased loan syndication revenue largely in the U.S. These factors were mostly offset by increased M&A activity and the impact from foreign exchange translation.

Other revenue decreased $169 million or 14% from last year mainly due to the change in fair value of certain derivatives used to economically hedge the AFS securities as noted above, partially offset by the gain related to the sale of RBC General Insurance Company.

2015 vs. 2014
Total revenue in 2015 increased $1,213 million or 4% as compared to 2014, primarily due to the impact from foreign exchange translation which increased revenue by $1,012 million, growth in average fee-based client assets in Wealth Management resulting from capital appreciation and net sales, solid volume growth across most of our businesses in Canadian Banking, and higher fee-based revenue primarily attributable to strong mutual funds distribution fees in Canadian Banking reflecting higher average client fee-based assets. Higher debt origination reflecting increased client issuance activity, strong growth in M&A activity reflecting increased mandates in the U.S. and Europe, higher trading-related net interest income and solid lending growth in Capital Markets as well as a gain of $108 million from the wind-up of a U.S.-based funding subsidiary also contributed to the increase. These factors were partially offset by the negative change in fair value of investments backing our policyholder liabilities of $463 million resulting from an increase in long-term interest rates, and a reduction of revenue related to our retrocession contracts, both of which were largely offset in PBCAE.

Additional trading information

Table 8

(Millions of Canadian dollars)	2016	2015	2014
Total trading revenue (1)			
Net interest income	$ 2,376	$ 2,398	$ 2,029
Non-interest income	701	552	742
Total trading revenue	$ 3,077	$ 2,950	$ 2,771
Total trading revenue by product			
Interest rate and credit	$ 1,804	$ 1,400	$ 1,560
Equities	684	1,045	814
Foreign exchange and commodities	589	505	397
Total trading revenue	$ 3,077	$ 2,950	$ 2,771
Trading revenue (teb) by product			
Interest rate and credit	$ 1,804	$ 1,400	$ 1,560
Equities	1,166	1,614	1,305
Foreign exchange and commodities	590	504	397
Total trading revenue (teb)	$ 3,560	$ 3,518	$ 3,262
Trading revenue (teb) by product – Capital Markets			
Interest rate and credit	$ 1,473	$ 1,238	$ 1,293
Equities	1,205	1,590	1,244
Foreign exchange and commodities	402	376	333
Total Capital Markets trading revenue (teb)	$ 3,080	$ 3,204	$ 2,870

(1) Includes a gain of $49 million (2015 – $40 million gain; 2014 – $105 million loss) related to a funding valuation adjustment on uncollateralized OTC derivatives.

2016 vs. 2015
Total trading revenue of $3,077 million, which comprises trading-related revenue recorded in Net interest income and Non-interest income, was up $127 million, or 4% including the impact from foreign exchange translation, mainly due to higher fixed income and foreign exchange trading revenue mainly in Europe and Canada. These factors were partially offset by lower equities trading revenue reflecting lower client activity.

2015 vs. 2014
Total trading revenue in 2015 of $2,950 million, which comprises trading-related revenue recorded in Net interest income and Non-interest income, was up $179 million, or 6% compared to 2014 including the impact from foreign exchange translation, mainly due to higher equities trading revenue reflecting increased client activity primarily in the first half of 2015. This factor was partially offset by lower revenue in certain legacy portfolios including the exit from certain proprietary trading strategies in 2014 to comply with the Volcker Rule, and lower fixed income trading revenue reflecting challenging market conditions in the second half of 2015. In addition, trading revenue in 2014 was unfavourably impacted by the implementation of funding valuation adjustments.

Provision for credit losses (PCL)

2016 vs. 2015
Total PCL increased $449 million or 41% from a year ago, mainly due to higher PCL in Capital Markets, Personal & Commercial Banking, and a $50 million increase in PCL for loans not yet identified as impaired reflecting volume growth and ongoing economic uncertainty. The PCL ratio of 29 bps increased 5 bps.

2015 vs. 2014
Total PCL in 2015 decreased $67 million or 6% as compared to 2014, mainly due to lower PCL in Personal & Commercial Banking, partially offset by higher PCL in Capital Markets and Wealth Management.

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

Insurance policyholder benefits, claims and acquisition expense

2016 vs. 2015
PBCAE increased $461 million or 16% from a year ago, mainly due to a change in the fair value of investments backing our policyholder liabilities, which was largely offset in revenue. This factor was partially offset by lower claims reflecting the impact from the sale of our home and auto insurance manufacturing business.

2015 vs. 2014

PBCAE in 2015 decreased $610 million or 17% from 2014, mainly due to a reduction of PBCAE related to our retrocession contracts, and the change in fair value of investments backing our policyholder liabilities resulting from the change in long-term interest rates, both of which were largely offset in revenue. These factors were partially offset by business growth in Canadian and International Insurance, a lower level of favourable actuarial adjustments in 2015 reflecting management actions and assumption changes, and an increase due to the impact of foreign exchange translation.

Non-interest expense

Table 9

(Millions of Canadian dollars, except percentage amounts)	2016	2015	2014
Salaries	$ 5,865	$ 5,197	$ 4,834
Variable compensation	4,407	4,533	4,388
Benefits and retention compensation	1,674	1,607	1,561
Share-based compensation	255	246	248
Human resources	$ 12,201	$ 11,583	$ 11,031
Equipment	1,438	1,277	1,147
Occupancy	1,568	1,410	1,330
Communications	945	888	847
Professional fees	1,078	932	763
Amortization of other intangibles	970	712	666
Other	1,936	1,836	1,877
Non-interest expense	$ 20,136	$ 18,638	$ 17,661
Efficiency ratio (1)	52.4%	52.8%	51.8%

(1) Efficiency ratio is calculated as non-interest expense divided by total revenue.

2016 vs. 2015

Non-interest expense increased $1,498 million or 8%, due to the inclusion of City National, which increased non-interest expense $1,648 million, and included $196 million related to the amortization of intangibles, and $91 million related to integration costs. Lower variable compensation, largely due to changes in the deferral policy of the compensation plan in Capital Markets, continuing benefits from our efficiency management activities, lower restructuring costs relating to the International Wealth Management business, and lower litigation provisions in Capital Markets were partially offset by higher costs in support of business growth, the impact from foreign exchange translation of $165 million, increased investment in technology initiatives and higher compliance costs.

Our efficiency ratio of 52.4% decreased 40 bps from 52.8% last year, mainly reflecting the increase in revenue due to the change in fair value of investments backing our policyholder liabilities, which was largely offset in PBCAE, continuing benefits from our efficiency management activities, and the gain on sale of RBC General Insurance Company. These factors were partially offset by the inclusion of our acquisition of City National.

2015 vs. 2014

Non-interest expense in 2015 increased $977 million or 6% compared to 2014, mainly reflecting the impact from foreign exchange translation of $652 million and higher costs in support of business growth. Restructuring costs of $122 million ($90 million after-tax) largely related to our International Wealth Management business also contributed to the increase. These factors were partially offset by lower litigation provisions and related legal costs in Capital Markets, and continuing benefits from our efficiency management activities. Non-interest expense in 2014 included the loss of $100 million related to the sale of RBC Jamaica and a provision of $40 million related to post-employment benefits and restructuring charges in the Caribbean.

Our efficiency ratio of 52.8% increased 100 bps from 51.8% in 2014, mainly reflecting the decrease in revenue due to the change in fair value of investments backing our policyholder liabilities, and higher costs in support of business growth, partially offset by continuing benefits from our efficiency management activities.

Income and other taxes

Table 10

(Millions of Canadian dollars, except percentage amounts)	2016	2015	2014
Income taxes	**$ 2,841**	$ 2,597	$ 2,706
Other taxes			
Goods and services sales taxes	**$ 442**	$ 426	$ 395
Payroll taxes	**627**	577	529
Capital taxes	**106**	100	86
Property taxes	**134**	121	106
Insurance premium taxes	**45**	50	51
Business taxes	**69**	59	8
	$ 1,423	$ 1,333	$ 1,175
Total income and other taxes	**$ 4,264**	$ 3,930	$ 3,881
Income before income taxes	**$ 13,299**	$ 12,623	$ 11,710
Canadian statutory income tax rate (1)	**26.5%**	26.3%	26.3%
Lower average tax rate applicable to subsidiaries	**(2.6)%**	(0.9)%	(2.3)%
Tax-exempt income from securities	**(3.1)%**	(3.6)%	(3.3)%
Tax rate change	**–%**	0.3%	–%
Effect of previously unrecognized tax loss, tax credit or temporary differences	**(0.4)%**	(0.1)%	(0.1)%
Other	**1.0%**	(1.4)%	2.5%
Effective income tax rate	**21.4%**	20.6%	23.1%
Effective total tax rate (2)	**29.0%**	28.2%	30.1%

(1) Blended Federal and Provincial statutory income tax rate.
(2) Total income and other taxes as a percentage of net income before income taxes and other taxes.

2016 vs. 2015
Income tax expense increased $244 million or 9% from last year, mainly due to higher earnings before income tax. The effective tax rate of 21.4% increased 80 basis points as last year included net favourable tax adjustments.

Other taxes increased $90 million or 7% from 2015 mainly due to higher payroll resulting from the inclusion of our acquisition of City National. In addition to the income and other taxes reported in our Consolidated Statements of Income, we recorded income tax recoveries of $438 million (2015 – $878 million) in shareholders' equity, primarily reflecting remeasurements of employee benefit plans.

2015 vs. 2014
Income tax expense decreased $109 million or 4% and the effective income tax rate of 20.6% decreased 250 bps from 2014, mainly due to net favourable tax adjustments in 2015, partially offset by higher earnings before income taxes.

Other taxes increased $158 million or 13% from 2014, mainly due to higher business and payroll taxes, as well as higher goods and services sales taxes.

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 78% of total AUA, as at October 31, 2016, followed by our Wealth Management business with approximately 17% of total AUA.

2016 vs. 2015
AUA increased $376 billion or 8% compared to last year, mainly reflecting capital appreciation, net sales, the impact from foreign exchange translation and the inclusion of our acquisition of City National.

The following table summarizes AUA by geography and asset class:

AUA by geographic mix and asset class — **Table 11**

(Millions of Canadian dollars)	2016	2015
Canada (1)		
Money market	$ 33,000	$ 31,500
Fixed income	731,200	685,600
Equity	705,900	669,900
Multi-asset and other	733,800	642,400
Total Canada	$ 2,203,900	$ 2,029,400
U.S. (1), (2)		
Money market	$ 36,400	$ 32,900
Fixed income	126,800	114,600
Equity	200,800	189,300
Multi-asset and other	44,800	35,600
Total U.S.	$ 408,800	$ 372,400
Other International (1)		
Money market	$ 50,300	$ 47,500
Fixed income	426,200	375,400
Equity	856,400	804,000
Multi-asset and other	1,113,300	1,054,400
Total International	$ 2,446,200	$ 2,281,300
Total AUA (2)	$ 5,058,900	$ 4,683,100

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

Assets under management
Assets under management (AUM) are assets managed by us which are beneficially owned by our clients. Management fees are paid by the investment funds for the investment capabilities of an investment manager and can also include administrative services. Management fees may be calculated daily, monthly or quarterly as a percentage of the AUM, depending on the distribution channel, underlying products 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 also include performance fee arrangements, which 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 that has AUM.

2016 vs. 2015
AUM increased $88 billion or 18% compared to last year, primarily due to the inclusion of our acquisition of City National and capital appreciation.

The following table presents the change in AUM for the year ended October 31, 2016:

Client assets – AUM — **Table 12**

	2016					2015
(Millions of Canadian dollars)	Money market	Fixed income	Equity	Multi-asset and other	Total	
AUM, beginning balance	$ 39,800	$ 196,300	$ 83,600	$ 178,700	$ 498,400	$ 457,000
Institutional inflows	11,200	35,800	4,800	3,400	55,200	n.a.
Institutional outflows	(14,400)	(52,000)	(3,900)	(1,800)	(72,100)	n.a.
Personal flows, net	700	4,300	500	16,100	21,600	n.a.
Total net flows	(2,500)	(11,900)	1,400	17,700	4,700	18,200
Market impact	200	8,100	5,100	8,100	21,500	n.a.
Acquisition	9,800	4,200	10,200	33,900	58,100	n.a.
Foreign exchange	600	2,000	500	500	3,600	n.a.
Total market, acquisition and foreign exchange impact	10,600	14,300	15,800	42,500	83,200	23,200
AUM, balance at end of year	$ 47,900	$ 198,700	$ 100,800	$ 238,900	$ 586,300	$ 498,400

n.a. not available

Business segment results

Results by business segment

Table 13

(Millions of Canadian dollars, except percentage amounts)	2016							2015	2014
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Total	Total
Net interest income	$ 10,337	$ 1,955	$ –	$ 825	$ 3,804	$ (390)	$ 16,531	$ 14,771	$ 14,116
Non-interest income	4,499	6,834	5,151	1,446	4,146	(202)	21,874	20,550	19,992
Total revenue	$ 14,836	$ 8,789	$ 5,151	$ 2,271	$ 7,950	$ (592)	$ 38,405	$ 35,321	$ 34,108
PCL	1,122	48	1	(3)	327	51	1,546	1,097	1,164
PBCAE	–	–	3,424	–	–	–	3,424	2,963	3,573
Non-interest expense	6,757	6,801	622	1,460	4,466	30	20,136	18,638	17,661
Net income before income taxes	$ 6,957	$ 1,940	$ 1,104	$ 814	$ 3,157	$ (673)	$ 13,299	$ 12,623	$ 11,710
Income tax	1,773	467	204	201	887	(691)	2,841	2,597	2,706
Net income	$ 5,184	$ 1,473	$ 900	$ 613	$ 2,270	$ 18	$ 10,458	$ 10,026	$ 9,004
ROE (2)	27.5%	10.9%	52.8%	17.9%	12.2%	n.m.	16.3%	18.6%	19.0%
Average assets	$ 403,800	$ 83,200	$ 14,400	$ 142,500	$ 508,200	$ 24,300	$ 1,176,400	$ 1,052,800	$ 906,500

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

(2) These measures 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.

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. The following highlights the key aspects of how 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 source of revenue. The use of teb adjustments and measures may not be comparable to similar generally accepted accounting principles (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, including residual asset/liability management results, impact from income tax adjustments, net charges associated with unattributed capital and PCL on loans not yet identified as impaired.

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 allocation

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

Capital attribution

Our 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 segments. This process determines the costs and revenue for intra-company borrowing and lending of funds after taking into consideration our interest rate risk and liquidity risk management objectives, as well as applicable regulatory requirements.

Provisions for credit losses
PCL are recorded to recognize estimated losses on impaired loans, as well as losses that have been incurred but are not yet identified in our loans portfolio. This portfolio includes on-balance sheet exposures, such as loans and acceptances, and off-balance sheet items such as letters of credit, guarantees and unfunded commitments. PCL on impaired loans are included in the results of each business segment to fully reflect the appropriate expenses related to the conduct of each business segment. PCL on loans not yet identified as impaired are included in Corporate Support, as Group Risk Management (GRM) effectively controls this through its monitoring and oversight of various lending portfolios throughout the enterprise. For details on our accounting policy on Allowance for credit losses, refer to Note 2 of our 2016 Annual Consolidated Financial Statements.

Key performance and non-GAAP measures

Performance measures
Return on common equity (ROE)
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 and risk 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 segment ROE information that we report. Other companies that disclose information on similar attributions and related return measures may use different assumptions, judgments and methodologies.

The following table provides a summary of our ROE calculations:

Calculation of ROE — **Table 14**

(Millions of Canadian dollars, except percentage amounts)	2016							2015	2014
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	Total	Total	Total
Net income available to common shareholders	$ 5,089	$ 1,412	$ 891	$ 596	$ 2,186	$ (63)	$ 10,111	$ 9,734	$ 8,697
Total average common equity (1), (2)	18,550	12,950	1,700	3,350	17,900	7,750	62,200	52,300	45,700
ROE (3)	27.5%	10.9%	52.8%	17.9%	12.2%	n.m.	16.3%	18.6%	19.0%

(1) Average common equity represents rounded figures.
(2) The amounts for the segments are referred to as attributed capital. Effective the first quarter of 2016, we increased our capital attribution rate to better align with higher regulatory capital requirements.
(3) ROE is based on actual balances of average common equity before rounding.
n.m. not meaningful

Embedded value for Insurance operations
Embedded value is a measure of shareholder value embedded in the balance sheet of our Insurance segment, excluding any value from future new sales. We use the change in embedded value between reporting periods as a measure of the value created by the insurance operations during the period.

We define embedded value as the value of equity held in our Insurance segment and the value of in-force business (existing policies). The value of in-force business is calculated as the present value of future expected earnings on in-force business less the cost of capital required to support in-force business. We use discount rates equal to long-term risk free rates plus a spread. Required capital uses the capital frameworks in the jurisdictions in which we operate.

Key drivers affecting the change in embedded value from period to period are new sales, investment performance, claims and policyholder experience, change in actuarial assumptions, changes in foreign exchange rates and changes in shareholder equity arising from transfers in capital.

Embedded value does not have a standardized meaning under GAAP and may not be directly comparable to similar measures disclosed by other companies. Given that this measure is specifically used for our Insurance segment and involves the use of discount rates to present value the future expected earnings and capital required for the in-force business, reconciliation to financial statements information is not applicable.

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, 2016 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 shareholder's equity, thus enabling users to identify relative contributions to shareholder value.

The capital charge includes a charge for common equity and preferred shares. For 2016, our cost of common equity remained unchanged at 9.0%.

The following table provides a summary of our Economic profit:

Economic profit **Table 15**

(Millions of Canadian dollars)	2016						
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	Total
Net income	$ 5,184	$ 1,473	$ 900	$ 613	$ 2,270	$ 18	$ 10,458
add: Non-controlling interests	(8)	–	–	(1)	–	(44)	(53)
After-tax effect of amortization of other intangibles	12	183	–	16	–	1	212
Goodwill and intangibles write-down	–	–	–	–	–	–	–
Adjusted net income (loss)	$ 5,188	$ 1,656	$ 900	$ 628	$ 2,270	$ (25)	$ 10,617
less: Capital charge	1,756	1,229	160	316	1,694	738	5,893
Economic profit (loss)	$ 3,432	$ 427	$ 740	$ 312	$ 576	$ (763)	$ 4,724

(Millions of Canadian dollars)	2015							2014
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Corporate Support	Total	Total
Net income	$ 5,006	$ 1,041	$ 706	$ 556	$ 2,319	$ 398	$ 10,026	$ 9,004
add: Non-controlling interests	(8)	2	–	(1)	–	(94)	(101)	(94)
After-tax effect of amortization of other intangibles	22	69	–	21	–	1	113	123
Goodwill and intangibles write-down	–	4	–	–	–	–	4	8
Adjusted net income (loss)	$ 5,020	$ 1,116	$ 706	$ 576	$ 2,319	$ 305	$ 10,042	$ 9,041
less: Capital charge	1,544	551	148	251	1,550	852	4,896	4,341
Economic profit (loss)	$ 3,476	$ 565	$ 558	$ 325	$ 769	$ (547)	$ 5,146	$ 4,700

Results excluding specified items
Our results were impacted by the following specified items:

- For the year ended October 31, 2016, a gain of $287 million ($235 million after-tax) recorded in our Insurance segment, related to the sale of RBC General Insurance Company to Aviva Canada Inc., which involved the sale of our home and auto insurance manufacturing business.
- For the year ended October 31, 2014, in our Personal & Commercial Banking segment:
  - A total loss of $100 million (before- and after-tax) related to the sale of RBC Jamaica, comprised of a loss of $60 million (before- and after-tax) in the first quarter of 2014, and a further loss of $40 million (before- and after-tax) in the third quarter of 2014 which includes foreign currency translation related to the closing of the sale of RBC Jamaica; and
  - A provision of $40 million ($32 million after-tax) related to post-employment benefits and restructuring charges in the Caribbean.

The following tables provide calculations of our business segment results and measures excluding these specified items for the years ended October 31, 2016 and October 31, 2014.

Insurance **Table 16**

(Millions of Canadian dollars, except percentage amounts)	2016		
		Item excluded	
	As reported	Gain related to the sale of RBC General Insurance	Adjusted
Total revenue	$ 5,151	$ (287)	$ 4,864
PBCAE	3,424	–	3,424
Non-interest expense (1)	623	–	623
Net income before income taxes	1,104	(287)	817
Net income	$ 900	$ (235)	$ 665
Selected balance and other information			
ROE	52.8%		41.0%

(1) Includes Provision for credit losses of $1 million.

Personal & Commercial Banking Table 17

(Millions of Canadian dollars, except percentage amounts)	2014			
		Items excluded		
	As reported	Loss related to the sale of RBC Jamaica (1)	Provision for post-employment benefits and restructuring charges	Adjusted
Total revenue	$ 13,730	$ –	$ –	$ 13,730
PCL	1,103	–	–	1,103
Non-interest expense	6,563	(100)	(40)	6,423
Net income before taxes	6,064	100	40	6,204
Net income	$ 4,475	$ 100	$ 32	$ 4,607
Selected balances and other information				
Non-interest expense	$ 6,563	$ (100)	$ (40)	$ 6,423
Total revenue	13,730			13,730
Efficiency ratio	47.8%			46.8%
Revenue growth rate	5.5%			5.5%
Non-interest expense growth rate	6.4%			4.2%
Operating leverage	(0.9%)			1.3%

(1) Total loss is comprised of a loss of $60 million (before- and after-tax) recorded in Q1 2014 and a further loss of $40 million (before- and after-tax) in Q3 2014, including foreign currency translation.

Personal & Commercial Banking

Operating through two businesses – Canadian Banking and Caribbean & U.S. Banking, Personal & Commercial Banking is comprised of our personal and business banking operations, and our auto financing and retail investment businesses, including our online discount brokerage channel. We provide services to more than 13.5 million individual, business and institutional clients across Canada, the Caribbean and the U.S. In Canada, we provide a broad suite of financial products and services through our extensive branch, automated teller machine (ATM), online, mobile and telephone banking networks, as well as through a large number of proprietary sales professionals. In the Caribbean, we offer a broad range of financial products and services to individuals and business clients, and public institutions in targeted markets. In the U.S., we serve the cross-border banking needs of Canadian clients within the U.S. through online channels.

In Canada, we compete with other Schedule I banks, independent trust companies, foreign banks, credit unions, caisses populaires and auto financing companies. We maintain top (#1 or #2) rankings in market share in this competitive environment for all key retail and business financial product categories, and have the largest branch network, the most ATMs and the largest mobile sales network across Canada. In the Caribbean, our competition includes banks, trust companies and investment management companies serving retail and corporate customers and public institutions. We continue to be the second-largest bank as measured by assets in the English Caribbean, with 77 branches in 17 countries and territories. In the U.S., we compete primarily with other Canadian banking institutions with operations in the U.S.

Economic and market review

We continued to see solid volume growth across most of our Canadian Banking businesses despite challenging economic conditions in Canada, particularly in the oil exposed regions. Overall, credit conditions have weakened from historically strong levels last year primarily due to higher unemployment in oil exposed provinces, while credit conditions remained relatively stable in other provinces. Our businesses continued to be impacted by competitive pressures and the low interest rate environment. In the Caribbean, unfavourable economic conditions continued to negatively impact our results through lower loan volume growth, and spread compression.

Highlights

In Canada:

- We achieved solid volume growth across most products with particular strengths in:
  - Home equity supported by our focus on the key newcomer and first time home buyer segments, coupled with our Employee Pricing campaigns;
  - Credit cards through strong account and balance growth in our industry leading Avion® card;
  - Personal and business deposits through acquisition of new clients and strengthening our existing client relationships;
  - Business lending through higher focus on select business segments and markets to strengthen our market share; and
  - Mutual fund branch investments through strong net inflows and capital appreciation strengthening our leading market share position.
- Became the first Canadian bank to offer free Interac e-Transfer payments for all personal chequing accounts.
- We currently service 5.2 million active clients through our online and mobile platforms, and continued to invest in digitizing our client experience with a focus on speed of service and simplifying end-to-end processes:
  - First North American financial institution to provide an in-branch, real-time, multi-language video capability available in more than 200 languages;
  - Implemented "Disbursement Hub", a new automated system that reduces the time it takes to provide funds to our mortgage clients upon closing, and connects all transaction stakeholders, including lawyers and notaries;
  - Launched "Add It", whereby pre-approved clients can set up their Royal Credit Line® with just four clicks, and without the need for paperwork or a branch visit;
  - Rolled out Touch ID Login (iPhone) and our iWatch app release providing more options for our clients to bank securely with us anywhere, anytime; and
  - Launched contactless point-of-sale at participating merchants by making Apple Pay‡ available to RBC debit and credit cardholders.
- As a result of our successes, we received external recognition as an industry leader and were named or ranked:
  - Highest in Customer Satisfaction among the Big Five Retail Banks in Canada 2016 (*J.D. Power*)
  - World's Best Global Bank for Consumer Banking; Best Trade Finance Bank in Canada 4 years in a row (*Global Finance*)
  - Best Payment Innovation and Best Use of Data Analytics for 2016 (*Retail Banker International*)

In the Caribbean:
- Improving our client experience through transformation of our branches, upgrade of our ATM network, rollout of the new mobile banking app and investment in specialized sales force capabilities.
- Continued to focus on quality asset growth in key client segments while reducing structural costs.
- As a result of our successes, we were named #1 Bank in the Caribbean for the second year in a row (*The Banker*).

Outlook and priorities

The Canadian economy is expected to grow by 1.8% in calendar 2017, driven by firm consumer spending, recovery in business investments and stable to improving unemployment rates. However, with risks remaining to the economic outlook, interest rates are expected to stay at their current low levels throughout 2017, underpinning solid volume growth for certain lending products. In addition, though the recent regulatory measures taken by Federal and Provincial governments to curb the pace of housing market growth in certain regions is expected to affect the demand for mortgage products, the continued low interest rate environment is expected to remain supportive of solid mortgage volume growth. As the low interest rate environment has resulted in compressed interest margins for industry participants, we continue to expect competitive pressures in the coming year. In 2017, we will continue to focus on building a digitally-enabled relationship bank and improving the client experience to successfully attract and retain new and existing clients.

In the Caribbean, challenging market conditions and slow economic growth continue to temper our outlook for 2017. We expect net interest margins to remain challenged primarily due to competitive pressures. However, we expect to strengthen our business performance through efficiency management, increases in fee revenue and quality asset growth.

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

Key strategic priorities for 2017

In Canada, our priorities are to:
- Transform how we serve clients by increasing points of access to our digital platforms and services and providing our clients with personalized advice and solutions, offers and client loyalty rewards.
- Accelerate growth in key segments and increase our presence in underpenetrated areas to achieve industry-leading volume growth.
- Rapidly deliver digital solutions to our clients.
- Innovate to become a more agile and efficient bank and accelerate our investments to simplify, digitize and automate for clients and employees.

In the Caribbean, we are focused on transforming our distribution channels to better serve our clients in target markets where we can compete and drive sustainable profitability, with a strategic focus on corporate, business, professional and business owner clientele. In the U.S., we are focused on meeting the banking and borrowing needs of our cross-border clients through an innovative direct banking approach by providing seamless access to their entire suite of RBC products.

Personal & Commercial Banking — **Table 18**

(Millions of Canadian dollars, except number of and percentage amounts and as otherwise noted)	2016	2015	2014
Net interest income	$ 10,337	$ 10,004	$ 9,743
Non-interest income	4,499	4,309	3,987
Total revenue	14,836	14,313	13,730
PCL	1,122	984	1,103
Non-interest expense	6,757	6,611	6,563
Net income before income taxes	6,957	6,718	6,064
Net income	$ 5,184	$ 5,006	$ 4,475
Revenue by business			
Canadian Banking	$ 13,833	$ 13,379	$ 12,869
Caribbean & U.S. Banking	1,003	934	861
Key ratios			
ROE	27.5%	30.0%	29.0%
NIM (1)	2.68%	2.71%	2.77%
Efficiency ratio (2)	45.5%	46.2%	47.8%
Efficiency ratio adjusted (2), (3)	n.a.	n.a.	46.8%
Operating leverage	1.5%	3.5%	(0.9)%
Operating leverage adjusted (3)	n.a.	1.3%	1.3%
Selected average balance sheet information			
Total assets	$ 403,800	$ 386,100	$ 367,900
Total earning assets	385,400	369,000	351,300
Loans and acceptances	383,900	367,500	350,700
Deposits	320,100	298,600	278,800
Other information			
AUA (4)	$ 239,600	$ 223,500	$ 214,200
AUM	4,600	4,800	4,000
Number of employees (FTE) (5)	33,896	35,211	36,315
Effective income tax rate	25.5%	25.5%	26.2%
Credit information			
Gross impaired loans as a % of average net loans and acceptances	0.43%	0.49%	0.55%
PCL on impaired loans as a % of average net loans and acceptances	0.29%	0.27%	0.31%

(1) NIM is calculated as Net interest income divided by Average total earning assets.
(2) Efficiency ratio is calculated as Non-interest expense divided by Total revenue.
(3) Measures have been adjusted by excluding the Q3 2014 loss of $40 million related to the closing of RBC Jamaica, and the Q1 2014 loss of $60 million related to the sale of RBC Jamaica and the provision of $40 million related to post-employment benefits and restructuring charges in the Caribbean. These are non-GAAP measures. For further details, refer to the Key performance and non-GAAP measures section.
(4) AUA represents period-end spot balances and includes securitized residential mortgages and credit card loans as at October 31, 2016 of $18.6 billion and $9.6 billion, respectively (October 31, 2015 – $21.0 billion and $8.0 billion; October 31, 2014 – $23.2 billion and $8.0 billion).
(5) Amounts have been revised from those previously presented.
n.a. not applicable

Financial performance
2016 vs. 2015
Net income increased $178 million or 4%, largely reflecting solid volume growth across most businesses partially offset by lower spreads and fee-based revenue growth in Canadian Banking. Higher earnings in the Caribbean also contributed to the increase. These factors were partially offset by higher costs in support of business growth and higher PCL in Canada.

Total revenue increased $523 million or 4% largely reflecting volume growth of 6% partly offset by lower spreads in Canada and higher fee-based revenue.

Net interest margin decreased 3 bps mainly due to the low interest rate environment.

PCL increased $138 million, with the PCL ratio increasing 2 bps, largely due to higher provisions in our Canadian personal and commercial lending portfolios and higher write-offs in our Canadian credit cards portfolio. These factors were partially offset by lower PCL in our Caribbean portfolios.

Non-interest expense increased $146 million or 2%, primarily attributable to higher technology spend and increased costs in support of business growth. These factors were partially offset by continuing benefits from our efficiency management activities.

Average loans and acceptances increased $16 billion or 4%, largely due to growth in Canadian residential mortgages and business loans.

Average deposits increased $22 billion or 7%, as a result of growth in business and personal deposits.

2015 vs. 2014
Net income was up $531 million or 12% from 2014. Excluding the loss of $100 million (before- and after-tax) related to the sale of RBC Jamaica, and a provision of $40 million ($32 million after-tax) related to post-employment benefits and restructuring charges in the Caribbean in 2014, net income increased $399 million or 9%, largely reflecting solid volume growth across most businesses in Canada, higher fee-based revenue primarily attributable to higher mutual fund distribution fees reflecting higher average client fee-based assets, higher card service revenue, higher earnings in the Caribbean and lower PCL. These factors were partially offset by higher technology and staff costs to support business growth and lower spreads.

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

In Canada, we operate through three business lines: Personal Financial Services, Business Financial Services, and Cards and Payment Solutions. The following provides a discussion of our consolidated Canadian Banking results.

Canadian Banking financial highlights — **Table 19**

(Millions of Canadian dollars, except number of and percentage amounts and as otherwise noted)	2016	2015	2014
Net interest income	$ 9,683	$ 9,377	$ 9,168
Non-interest income	4,150	4,002	3,701
Total revenue	13,833	13,379	12,869
PCL	1,080	912	928
Non-interest expense	6,010	5,891	5,687
Net income before income taxes	6,743	6,576	6,254
Net income	$ 5,002	$ 4,877	$ 4,642
Revenue by business			
Personal Financial Services	$ 7,810	$ 7,634	$ 7,285
Business Financial Services	3,190	3,091	3,135
Cards and Payment Solutions	2,833	2,654	2,449
Key Ratios			
ROE	32.6%	36.4%	37.0%
NIM (1)	2.63%	2.66%	2.71%
Efficiency ratio (2)	43.4%	44.0%	44.2%
Operating leverage	1.4%	0.4%	1.2%
Selected average balance sheet information			
Total assets	$ 381,000	$ 364,900	$ 349,500
Total earning assets	368,100	352,800	337,900
Loans and acceptances	374,600	358,500	343,100
Deposits	301,400	281,200	263,600
Other information			
AUA (3)	231,400	213,700	205,200
Number of employees (FTE) (4)	29,982	31,057	31,583
Effective income tax rate	25.8%	25.8%	25.8%
Credit information			
Gross impaired loans as a % of average net loans and acceptances	0.27%	0.30%	0.33%
PCL on impaired loans as a % of average net loans and acceptances	0.29%	0.25%	0.27%

(1) NIM is calculated as Net interest income divided by Average total earning assets.
(2) Efficiency ratio is calculated as Non-interest expense divided by Total revenue.
(3) AUA represents period-end spot balances and includes securitized residential mortgages and credit card loans as at October 31, 2016 of $18.6 billion and $9.6 billion, respectively, (October 31, 2015 – $21.0 billion and $8.0 billion; October 31, 2014 – $23.2 billion and $8.0 billion).
(4) Amounts have been revised from those previously presented.

Financial performance
2016 vs. 2015
Net income increased $125 million or 3% largely reflecting solid volume growth across most businesses partially offset by lower spreads, and fee-based revenue growth. These factors were partially offset by higher PCL and higher costs in support of business growth.

Total revenue increased $454 million or 3%, largely reflecting volume growth of 6% partly offset by lower spreads. Fee-based revenue growth mainly from higher credit card balances and transaction volumes driving higher card service revenue, and increased client activity also contributed to the increase.

Net interest margin decreased 3 bps compared to last year mainly due to the low interest rate environment.

PCL increased $168 million, with the PCL ratio increasing 4 bps, mostly due to higher provisions in our personal and commercial lending portfolios and higher write-offs in our credit cards portfolio.

Non-interest expense increased $119 million or 2% mainly due to higher technology spend and increased costs in support of business growth. These factors were partially offset by continuing benefits from our efficiency management activities.

Average loans and acceptances increased $16 billion or 4%, mainly due to 7% average growth in residential mortgages and business loans.

Average deposits increased $20 billion or 7%, primarily reflecting growth in both business and personal deposits.

2015 vs. 2014
Net income increased $235 million or 5% from 2014, reflecting solid volume growth across most businesses, strong fee-based revenue growth primarily attributable to higher mutual fund distribution fees due to higher average client fee-based assets, as well as higher credit card balances and transaction volumes driving higher card service revenue. These factors were partially offset by higher technology and staff costs to support business growth, and lower spreads.

Business line review

Personal Financial Services

Personal Financial Services 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, including home equity financing, personal lending, deposit accounts, Canadian private banking, indirect lending (including auto financing), mutual funds and self-directed brokerage accounts, and Guaranteed Investment Certificates (GICs). 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 1,268 branches and over 4,550 ATMs.

Financial performance
Total revenue increased $176 million or 2% compared to last year, primarily reflecting volume growth of 7% in deposits and residential mortgages partially offset by lower spreads, and increased client activity.

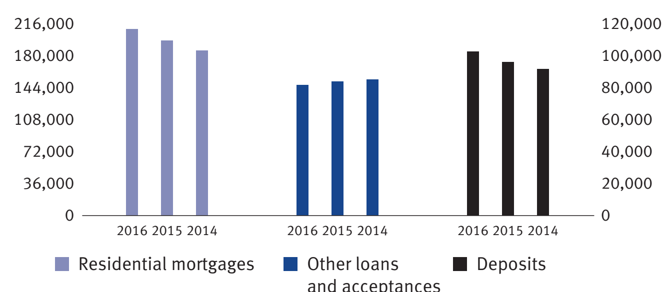
Average residential mortgages increased 7% compared to last year, resulting from solid housing market activity supported by the continuing low interest rate environment and our targeted marketing strategy. Average other loans and acceptances decreased 3% from last year largely due to lower indirect lending volumes. Average deposits increased 7% from last year largely reflecting the acquisition of new clients as well as continued growth of existing client balances. Strong client acquisition contributed to increased client activity and continued growth of average client fee-based assets.

Selected highlights — Table 20

(Millions of Canadian dollars, except number of)	2016	2015	2014
Total revenue	$ 7,810	$ 7,634	$ 7,285
Other information (average)			
Residential mortgages	210,400	197,300	186,000
Other loans and acceptances	81,800	84,100	85,400
Deposits (1)	185,600	173,000	165,100
Branch mutual fund balances (2)	132,100	122,000	111,600
AUA – Self-directed brokerage (2)	69,700	61,400	60,500
Number of:			
New deposit accounts opened (thousands)	1,346	1,420	1,514
Branches	1,268	1,275	1,272
ATM	4,555	4,542	4,620

(1) Includes GIC balances.
(2) Represents year-end spot balances.

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



Business Financial Services

Business Financial Services offers a wide range of lending, leasing, deposit, investment, foreign exchange, cash management, auto dealer financing (floor plan), trade products and services to small and medium-sized commercial businesses, as well as agriculture and agribusiness clients 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 $99 million or 3% compared to last year primarily due to volume growth in both loans and deposits, which was partially offset by lower spreads reflecting the continuing low interest rate environment and competitive pressures.

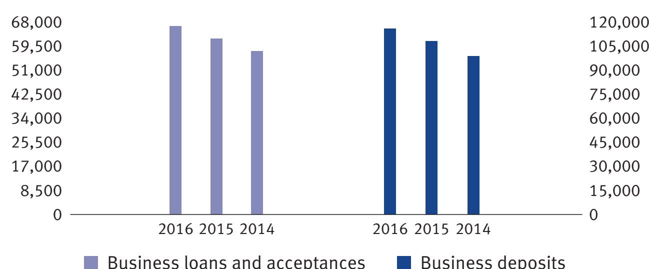
Average loans and acceptances increased 7% and average deposits were up 7%, despite a competitive environment, due to increased activity from existing and new clients.

Selected highlights — Table 21

(Millions of Canadian dollars)	2016	2015	2014
Total revenue	$ 3,190	$ 3,091	$ 3,135
Other information (average)			
Loans and acceptances	66,400	62,000	57,600
Deposits (1)	115,800	108,200	98,500

(1) Includes GIC balances.

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



Cards and Payment Solutions

Cards and Payment Solutions provides a wide array of credit cards with loyalty and reward benefits, and payment products and solutions within Canada. We have over 7 million credit card accounts and have approximately 24% market share of Canada's credit card purchase volume.

In addition, this business line includes our 50% interest in Moneris Solutions, Inc., our merchant card processing joint venture with the Bank of Montreal. Moneris processes approximately $235 billion in annual credit and debit card transaction volumes.

Financial performance

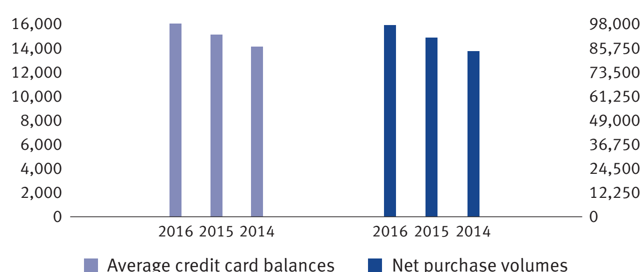
Total revenue increased $179 million or 7% compared to last year, driven by higher credit card balances, increased transaction volumes, and improved spreads.

Average credit card balances increased 6% and net purchase volumes increased 7% due to higher client activity, including strong new account acquisition.

Selected highlights — Table 22

(Millions of Canadian dollars)	2016	2015	2014
Total revenue	$ 2,833	$ 2,654	$ 2,449
Other information			
Average credit card balances	16,000	15,100	14,100
Net purchase volumes	97,400	90,800	84,200

Average credit card balances and net purchase volumes
(Millions of Canadian dollars)



Caribbean & U.S. Banking

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

Our U.S. cross-border banking business serves the needs of our Canadian clients within the U.S. through online and mobile channels, and offers a broad range of financial products and services to individual and business clients across all 50 states.

Financial performance

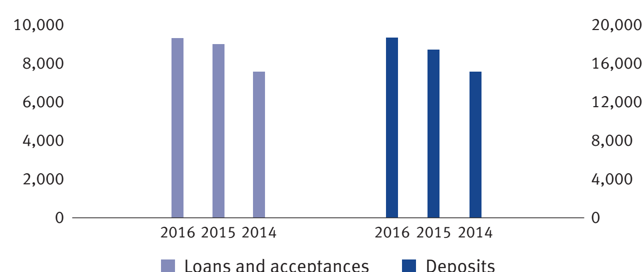
Total revenue was up $69 million or 7% from last year, primarily due to the positive impact of foreign exchange translation, higher fee-based revenue reflecting full service pricing in the Caribbean, and higher interest earned in our securities investment portfolio.

Average loans and acceptances increased 3%, and average deposits increased 7%, mostly due to the impact from foreign exchange translation.

Selected highlights **Table 23**

(Millions of Canadian dollars, number of and percentage amounts)	2016	2015	2014
Total revenue	$ 1,003	$ 934	$ 861
Other information			
Net interest margin	3.78%	3.87%	4.29%
Average loans and acceptances	$ 9,300	$ 9,000	$ 7,600
Average deposits	18,700	17,400	15,200
AUA	8,200	9,800	9,000
AUM	4,600	4,800	4,000
Number of:			
Branches	77	79	93
ATM	276	274	309

Average loans and deposits (Millions of Canadian dollars)



Wealth Management

Wealth Management comprises Canadian Wealth Management, U.S. Wealth Management (including City National), International Wealth Management and Global Asset Management (GAM). Wealth Management serves individual and institutional clients in target markets around the world. From our offices in key financial centres mainly in Canada, the U.S., the U.K., the Channel Islands and Asia, Wealth Management offers a comprehensive suite of investment, trust, banking, credit and other wealth management solutions to affluent, high net worth (HNW) and ultra-high net worth (UHNW) clients. Our asset management group, Global Asset Management, which includes BlueBay Asset Management (BlueBay), is an established global leader in investment management services, providing investment strategies and fund solutions directly to institutional investors and also to individual clients through our distribution channels and third-party distributors. On November 2, 2015, we completed the acquisition of City National, which has enhanced and complemented our existing U.S. businesses and product offerings.

Economic and market review

Canada and the U.S. saw a softening in growth and economic performance in 2016, which resulted in a challenging market environment during the first half of 2016. In the latter part of the year, we saw improved investor confidence and market conditions driving growth in our average fee-based client assets through capital appreciation and higher net sales. The Eurozone continued to stimulate economic activity through the ECB's quantitative easing program. Globally, volatile capital markets have led to lower transactional volumes. Furthermore, increased regulatory requirements have had an adverse impact on compliance and technology costs.

Highlights

- The integration of City National has enhanced and complemented our presence in the U.S., further expanding our product offerings to select HNW clients, leveraging the combined platform for commercial clients, and continuing to extend industry verticals with RBC Capital Markets® expertise.
- We continue to grow and invest in our high-performing global asset management business and maintain leading market share of 14.8% in the Canadian mutual fund industry with strong positive net inflows. We continued to increase BlueBay's distribution footprint with institutional clients and expand our international distribution capabilities to the U.S. and international institutional clients and professional buyers.
- In Canada, our full service private wealth business is the industry leader. We continue to extend our leadership amongst HNW clients by focusing on delivering comprehensive value to our clients, leveraging our expertise around business owners, succession and wealth planning.
- In the U.S., we are among the top 10 full service brokerage firms in terms of assets under administration and number of advisors, and we continue to focus on improving advisor productivity. Furthermore, our recent acquisition of City National has enhanced our U.S. product offering.
- Outside Canada and the U.S., we continued to realign our International Wealth Management business to focus on key client segments, including HNW and UHNW clients in select target markets, while enhancing our product offering and operating environment to a more conservative risk profile.
- The strength of our global capabilities and continued commitment to deliver integrated global wealth management advice and solutions to HNW and UHNW clients has helped us earn significant industry awards. We were ranked or named:
  - Fifth largest global wealth manager by client assets (*Scorpio Partnership's 2016 Global Private Banking KPI Benchmark*) for the third year in a row.
  - Best Private Bank in Canada (PWM/*The Banker* Global Private Banking Awards, 2016) for the fifth consecutive year.
  - Best Canadian Private Bank (Family Wealth Report Awards, 2016).

Outlook and priorities

With continued uncertainty in the major global economies, including Canada, low interest rates are expected to continue into 2017. Despite the overall economic uncertainty and volatile equity markets, we expect global private wealth to continue to drive growth in the HNW and UHNW client segments. We will continue to leverage our brand, reputation and financial strength to increase our market share of HNW and UHNW globally. In addition, changing demographics and rapid advancements in digitization are expected to drive change in client preferences, needs and service models, requiring a greater focus on delivering a digitally-integrated, multi-channel experience for our clients and client-facing professionals.

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

Key strategic priorities for 2017

- Focus on extending our leadership position in Canadian retail asset management (e.g., GAM penetration of Personal & Commercial Banking, Wealth Management and third-party channels) while expanding distribution to primarily U.S., U.K. and certain European institutional clients
- Drive profitable growth through continued acquisition and retention of HNW and UHNW clients in priority segments and markets, driven by a differentiated client experience that is increasingly digitally-enabled and supported by data-driven insights
- Continue to deepen client relationships in Canada jointly with our partners (e.g., Private Banking and Commercial Banking in Personal & Commercial Banking), and leverage the combined strengths of City National, RBC U.S. Wealth Management and Capital Markets to accelerate growth in the U.S.

Wealth Management **Table 24**

(Millions of Canadian dollars, except number of and percentage amounts and as otherwise noted)	2016	2015	2014
Net interest income	$ 1,955	$ 493	$ 469
Non-interest income			
Fee-based revenue	5,109	4,699	4,185
Transactional and other revenue	1,725	1,583	1,659
Total revenue	8,789	6,775	6,313
PCL	48	46	19
Non-interest expense	6,801	5,292	4,800
Income before income taxes	1,940	1,437	1,494
Net income	$ 1,473	$ 1,041	$ 1,083
Revenue by business			
Canadian Wealth Management	$ 2,450	$ 2,308	$ 2,146
U.S. Wealth Management (including City National)	4,123	2,008	1,748
U.S. Wealth Management (including City National) (US$ millions)	3,118	1,603	1,599
International Wealth Management	430	639	722
Global Asset Management (1)	1,786	1,820	1,697
Key Ratios			
ROE	10.9%	17.4%	19.2%
NIM (2)	2.84%	2.50%	2.68%
Pre-tax margin (3)	22.1%	21.2%	23.7%
Selected average balance sheet information			
Total assets	$ 83,200	$ 29,100	$ 25,800
Loans and acceptances	49,200	17,700	15,700
Deposits	85,400	39,500	36,200
Attributed capital	12,950	5,900	5,500
Other information			
Revenue per advisor (000s) (4)	$ 1,157	$ 1,089	$ 983
AUA (5), (6)	875,300	823,700	781,400
AUM (5)	580,700	492,800	452,300
Average AUA (6)	845,800	826,700	711,700
Average AUM	560,800	484,700	427,800
Number of employees (FTE) (6)	16,385	12,325	12,636
Number of advisors (7)	4,780	3,954	4,245

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)	2016 vs. 2015
Increase (decrease):	
Total revenue	$ 94
Non-interest expense	74
Net income	14
Percentage change in average US$ equivalent of C$1.00	(5)%
Percentage change in average British pound equivalent of C$1.00	5%
Percentage change in average Euro equivalent of C$1.00	(3)%

(1) Effective the first quarter of 2014, we have aligned the reporting period of BlueBay, which resulted in an additional month of earnings being included in 2014.
(2) NIM is calculated as Net interest income divided by Average total earning assets.
(3) Pre-tax margin is defined as net 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) Amounts have been revised from those previously presented.
(7) Represents client-facing advisors across all our wealth management businesses.

Client assets – AUA **Table 25**

(Millions of Canadian dollars)	2016	2015 (1)
AUA, beginning balance	$ 823,700	$ 781,400
Asset inflows	251,000	n.a.
Asset outflows	(257,500)	n.a.
Total net flows	(6,500)	(28,900)
Market impact	31,100	n.a.
Acquisitions	17,800	n.a.
Foreign exchange	9,200	n.a.
Total market, acquisition and foreign exchange impact	58,100	71,200
AUA, balance at end of year	$ 875,300	$ 823,700

(1) Amount has been revised from those previously presented.
n.a. not available

Client assets – AUM — Table 26

(Millions of Canadian dollars)	2016 Money market	2016 Fixed income	2016 Equity	2016 Multi-asset and other	2016 Total	2015
AUM, beginning balance	$ 39,800	$ 194,300	$ 83,600	$ 175,100	$ 492,800	$ 452,300
Institutional inflows	11,300	35,300	4,800	3,300	54,700	n.a.
Institutional outflows	(14,400)	(51,500)	(3,900)	(1,800)	(71,600)	n.a.
Personal flows, net	700	4,300	500	16,000	21,500	n.a.
Total net flows	(2,400)	(11,900)	1,400	17,500	4,600	18,200
Market impact	200	8,200	5,100	8,100	21,600	n.a.
Acquisition	9,800	4,200	10,200	33,900	58,100	n.a.
Foreign exchange	600	2,000	500	500	3,600	n.a.
Total market, acquisition and foreign exchange impact	10,600	14,400	15,800	42,500	83,300	22,300
AUM, balance at end of year	$ 48,000	$ 196,800	$ 100,800	$ 235,100	$ 580,700	$ 492,800

n.a. not available

AUA by geographic mix and asset class — Table 27

(Millions of Canadian dollars)	2016	2015
Canada (1)		
Money market	$ 21,600	$ 21,500
Fixed income	36,300	34,900
Equity	89,100	79,800
Multi-asset and other	180,700	157,400
Total Canada	$ 327,700	$ 293,600
U.S. (1), (2)		
Money market	$ 36,100	$ 32,700
Fixed income	126,800	114,600
Equity	200,800	189,300
Multi-asset and other	30,500	20,200
Total U.S.	$ 394,200	$ 356,800
Other International (1)		
Money market	$ 23,300	$ 24,500
Fixed income	21,400	26,500
Equity	89,600	93,300
Multi-asset and other	19,100	29,000
Total International	$ 153,400	$ 173,300
Total AUA (2)	$ 875,300	$ 823,700

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

On November 2, 2015, we completed the acquisition of City National, which was combined with our U.S. Wealth Management business. Our U.S. & International Wealth Management business line was divided into two businesses: U.S. Wealth Management (including City National), and International Wealth Management.

Financial performance
2016 vs. 2015
Net income increased $432 million or 41% compared to last year, largely reflecting the inclusion of our acquisition of City National, which contributed $290 million to net income, lower restructuring costs relating to the International Wealth Management business, and benefits from our efficiency management activities. These factors were partially offset by lower transaction volumes.

Total revenue increased $2,014 million or 30%, mainly attributable to our inclusion of City National, which contributed $1,988 million (US$1,502 million), the impact from foreign exchange translation, and higher fee-based revenue primarily in our Canadian Wealth Management and U.S. Wealth Management businesses. These factors were partially offset by lower transaction volumes.

PCL increased $2 million. PCL in the current year largely reflects provisions of $43 million recorded in City National. PCL in the prior year largely reflected provisions related to the International Wealth Management business.

Non-interest expense increased $1,509 million or 29%, primarily reflecting our inclusion of City National, which increased expenses by $1,648 million, and included $196 million related to amortization of intangibles and $91 million related to integration costs. The impact from foreign exchange translation and costs relating to the exit of certain international businesses also contributed to the increase. These factors were partially offset by lower restructuring costs and benefits from our efficiency management activities.

Assets under administration increased by $52 billion or 6% compared to the prior year, mainly reflecting capital appreciation, the impact of foreign exchange translation and the inclusion of our acquisition of City National.

Assets under management increased by $88 billion or 18% compared to the prior year, primarily due to the inclusion of our acquisition of City National and capital appreciation.

2015 vs. 2014
Net income decreased $42 million or 4% from 2014, primarily reflecting higher costs in support of business growth in our Global Asset Management and Canadian Wealth Management businesses, restructuring costs of $122 million ($90 million after-tax) largely related to our International Wealth Management business, lower transaction volumes and higher PCL. These factors were partly offset by higher earnings from growth in average fee-based client assets resulting from capital appreciation and 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 1,650 investment advisors providing comprehensive advice-based financial solutions to affluent, HNW and UHNW clients. Additionally, we provide discretionary investment management and estate and trust services to our clients through approximately 70 investment counsellors and 91 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

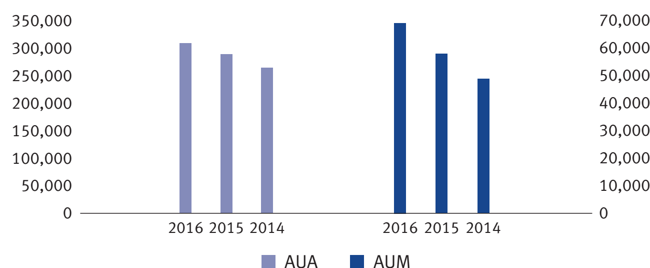
Revenue increased $142 million or 6% from a year ago, mainly due to higher average fee-based client assets reflecting strong net sales and capital appreciation and higher net interest income reflecting growth in average deposits.

Selected highlights (1) — **Table 28**

(Millions of Canadian dollars)	2016	2015	2014
Total revenue	**$ 2,450**	$ 2,308	$ 2,146
Other information			
Total loans and acceptances (2)	**3,200**	3,100	2,700
Total deposits (2)	**16,300**	15,200	13,600
AUA	**326,600**	297,400	280,400
AUM	**76,000**	62,800	55,100
Average AUA	**309,100**	289,500	265,000
Average AUM	**69,400**	58,100	49,100
Total assets under fee-based programs	**206,900**	184,500	168,300

(1) Amounts have been revised from those previously presented.
(2) Represents an average amount, which is calculated using methods intended to approximate the average of the daily balances for the period.

Average AUA and AUM (1) (Millions of Canadian dollars)



(1) Represents average balances, which we believe are more representative of the impact client balances have upon our revenue.

U.S. Wealth Management (including City National)

U.S. Wealth Management (including City National) includes our private client group, which is the 7th largest full service wealth advisory firm in the U.S., as measured by number of advisors, with over 1,800 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. In the U.S., we operate in a fragmented and extremely competitive industry. There are approximately 4,000 registered broker-dealers in the U.S., comprising independent, regional and global players. As previously announced, we combined U.S. Wealth Management and City National into one line of business effective the first quarter of 2016.

City National is headquartered in Los Angeles, California and operates through 73 offices, including 16 full service regional centres in Southern California, the San Francisco Bay area, New York City, Nashville and Atlanta. 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, and other products and services. City National competes with a variety of commercial banks and other financial institutions which serve high net worth individuals, entrepreneurs and their businesses.

Financial performance

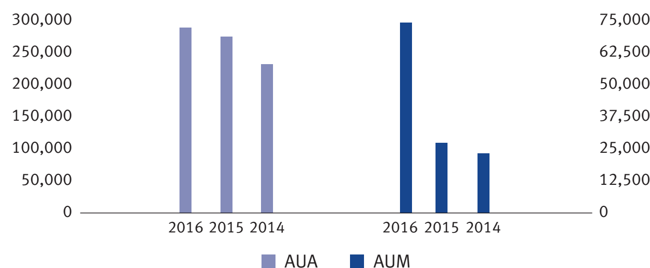
Revenue increased $2,115 million or 105% from a year ago, mainly reflecting the inclusion of City National, which contributed $1,988 million (US$1,502 million).

Selected highlights — **Table 29**

(Millions of Canadian dollars, except as otherwise noted)	2016	2015	2014
Total revenue	**$ 4,123**	$ 2,008	$ 1,748
Other information (Millions of U.S. dollars)			
Total revenue	**3,118**	1,603	1,599
Total loans, guarantees and letters of credit (1)	**29,900**	4,400	4,000
Total deposits (1)	**41,200**	3,700	1,800
AUA	**293,900**	272,900	275,500
AUM	**76,700**	28,600	25,600
Average AUA	**289,200**	275,100	232,300
Average AUM	**74,200**	27,300	23,200
Total assets under fee-based programs	**98,400**	94,500	94,500

(1) Represents an average amount, which is calculated using methods intended to approximate the average of the daily balances for the period.

Average AUA and AUM (1) (Millions of U.S. dollars)



(1) Represents average balances, which we believe are more representative of the impact client balances have upon our revenue.

International Wealth Management

International Wealth Management includes operations in the British Isles and Asia. We provide customized and integrated trust, banking, credit and investment solutions to HNW and UHNW clients and corporate clients with over 1,400 employees located in key financial centres in Europe and Asia. Competitors to our International Wealth Management business comprise global wealth managers, traditional offshore private banks, domestic wealth managers and U.S. investment-led private client operations.

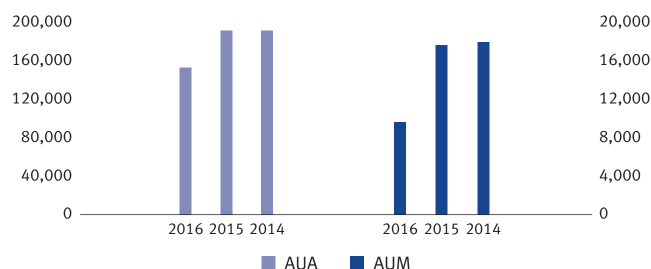
Financial performance
Revenue decreased $209 million or 33% from a year ago, mainly reflecting the exit of certain international businesses.

Selected highlights — **Table 30**

(Millions of Canadian dollars)	2016	2015	2014
Total revenue	$ 430	$ 639	$ 722
Other information			
Total loans, guarantees and letters of credit (1)	7,200	11,700	12,000
Total deposits (1)	14,600	19,700	20,600
AUA	154,500	169,500	190,500
AUM	9,100	10,900	17,700
Average AUA	153,700	192,300	192,300
Average AUM	9,700	17,700	18,000

(1) Represents an average amount, which is calculated using methods intended to approximate the average of the daily balances for the period.

Average AUA and AUM (1) (Millions of Canadian dollars)



(1) Represents average balances, which we believe are more representative of the impact client balances have upon our revenue.

Global Asset Management

Global Asset Management provides global investment management services and solutions for individual and institutional investors in Canada, the U.S., the U.K., 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, asset management organizations and boutique firms. The Canadian fund management industry is large and mature, but still 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 leading 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, regional and boutique asset managers in the geographies where we serve clients.

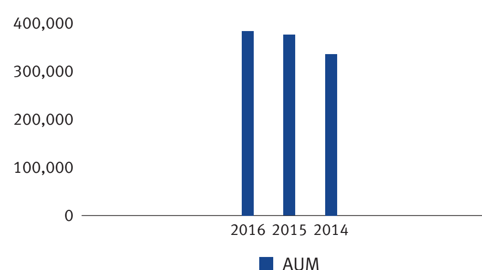
Financial performance
Revenue decreased $34 million or 2% from a year ago, reflecting unfavourable market conditions resulting in net redemptions in the first half of the year. This was partially offset by strong performance in the Canadian business in the second half of the year due to improved market conditions.

Selected highlights — **Table 31**

(Millions of Canadian dollars)	2016	2015	2014
Total revenue (1)	$ 1,786	$ 1,820	$ 1,697
Other information			
Canadian net long-term mutual fund sales (2)	7,868	9,857	10,982
Canadian net money market mutual fund (redemptions) sales (2)	(439)	(605)	(1,229)
AUM	392,600	381,700	350,600
Average AUM	383,400	374,700	335,300

(1) Effective the first quarter of 2014, we have aligned the reporting period of BlueBay, which resulted in an additional month of earnings being included in 2014.
(2) As reported to the Investment Funds Institute of Canada. Includes all prospectus-based mutual funds across our Canadian Global Asset Management businesses.

Average AUM (1) (Millions of Canadian dollars)



(1) Represents average balances, which we believe are more representative of the impact client balances have upon our revenue.

Insurance

Insurance comprises our operations in Canada and globally and operates under two business lines: Canadian Insurance and International Insurance, providing a wide range of life, health, home, auto, travel, wealth, group and reinsurance products and solutions. In Canada, we offer our products and services through our proprietary distribution channels, comprised of the field sales force which includes retail insurance stores, our field sales representatives, advice centres and online, as well as through independent insurance advisors and affinity relationships. Outside Canada, we operate in reinsurance markets globally offering life, accident and annuity reinsurance products. The competitive environment for each business is discussed below.

Economic and market review

The global macroeconomic environment continues to show improvement, with both the middle class and high net worth populations in quantity and financial resources on the rise in many countries. Key challenges for the insurance industry remain due to the increasing regulatory pressures, low interest rates, record high levels of debt, shifting demographics, changes in client expectations, and growth in non-traditional competitors. To overcome these challenges, many insurers are heavily investing in technological and digital solutions to improve the client experience and provide differentiation, refining products and distribution capability, and enhancing operational efficiency and managing expenses.

Highlights

- On July 1, 2016, we completed the sale of RBC General Insurance Company to Aviva Canada Inc. (Aviva). The transaction involved the sale of our home and auto insurance manufacturing business and included a 15-year strategic distribution agreement between RBC Insurance and Aviva.
- In our Canadian Insurance business, we experienced strong sales growth, maintaining our #1 ranking in individual disability sales, #11 in individual life products and have been increasing market share in Group Insurance and Wealth, which are targeted areas of focus.
- We launched *Your*Term™, a new life insurance product, as part of an innovative renewal and client retention strategy, allowing clients to select a specific term for their life insurance.
- We have partnered with digital insurer League to underwrite its expanded offerings, providing comprehensive coverage for unexpected emergencies, as well as a range of group life and health insurance products, including life, accidental death and dismemberment, and disability coverage.
- We continued to focus on enhancing our client experience and our cost effectiveness through ongoing transformation of our legacy business and enhancing our digital capabilities.
- In the fall of 2016, we introduced new and innovative tools to help clients who are on disability recover and return to work more quickly. These include an exclusive arrangement with Best Doctors Onward as well as a partnership with Medical Confidence.
- We continued to expand our U.K. annuity business, though we experienced some volatility reflecting changing market conditions, including foreign exchange impacts after the Brexit vote.

Outlook and priorities

While we see signs of improvement in the macroeconomic environment, growing risk and economic insecurity continue to prevail; therefore, growth in the industry is projected to be moderate in the short to medium term. We are focusing on organic growth through our proprietary sales channels, improved claims performance and increased operational efficiency.

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

Key strategic priorities for 2017

- Deepen client relationships by continuing to be an innovative, client-focused provider of a full suite of insurance products.
- Continue to improve our distribution efficiency by expanding our proprietary distribution channels and focusing on the delivery of technology and operational solutions.
- Simplify and innovate by accelerating our digital initiatives time to market, improving quality and cost effectiveness.
- Pursue select international opportunities, within our risk appetite, with the aim of continuing to grow our core reinsurance business.

Insurance **Table 32**

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2016	2015	2014
Non-interest income			
Net earned premiums	$ 3,175	$ 3,507	$ 3,742
Investment income (1)	1,422	445	938
Fee income	554	484	284
Total revenue	5,151	4,436	4,964
Insurance policyholder benefits and claims (1)	3,208	2,741	3,194
Insurance policyholder acquisition expense	216	222	379
Non-interest expense (2)	623	613	579
Income before income taxes	1,104	860	812
Net income	$ 900	$ 706	$ 781
Revenue by business			
Canadian Insurance	$ 3,373	$ 2,725	$ 2,911
International Insurance	1,778	1,711	2,053
Key ratios			
ROE	52.8%	44.3%	49.7%
Selected balances and other information			
Total assets	$ 14,400	$ 13,700	$ 12,000
Attributed capital	1,700	1,600	1,550
Other information			
Premiums and deposits (3)	$ 4,594	$ 5,016	$ 5,164
Canadian Insurance	2,424	2,725	2,419
International Insurance	2,170	2,291	2,745
Insurance claims and policy benefit liabilities	9,164	9,110	8,564
Fair value changes on investments backing policyholder liabilities (1)	633	(24)	439
Embedded value (4)	6,886	6,952	6,239
Number of employees (FTE)	2,657	3,163	3,126

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

(Millions of Canadian dollars, except percentage amounts)	2016 vs. 2015
Increase (decrease):	
Total revenue	$ (54)
PBCAE	(39)
Non-interest expense	–
Net income	(15)
Percentage change in average US$ equivalent of C$1.00	(5)%
Percentage change in average British pound equivalent of C$1.00	5%

(1) Investment income can experience volatility arising from fluctuation of fair value through profit or loss (FVTPL) assets. The investments which support actuarial liabilities are predominantly fixed income assets designated as at FVTPL. Consequently, changes in the fair values of these assets are recorded in investment income in the consolidated statement 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 and claims.
(2) For 2016, includes PCL of $1 million (2015 - $nil; 2014 - $nil).
(3) Premiums and deposits include premiums on risk-based insurance and annuity products, and individual and group segregated fund deposits, consistent with insurance industry practices.
(4) Embedded value is defined as the sum of value of equity held in our Insurance segment and the value of in-force business (existing policies). For further details, refer to the Key performance and non-GAAP measures section.

On July 1, 2016, we completed the sale of RBC General Insurance Company to Aviva Canada Inc. (Aviva) as previously announced on January 21, 2016. The transaction involved the sale of our home and auto insurance manufacturing business and included a 15-year strategic distribution agreement between RBC Insurance and Aviva. As a result of the transaction, we recorded a gain of $287 million ($235 million after-tax) in our results. For further details, refer to Note 11 of our 2016 Annual Consolidated Financial Statements.

Financial performance
2016 vs. 2015
Net income increased $194 million or 27% from a year ago. Excluding the after-tax gain of $235 million on the sale of RBC General Insurance Company to Aviva, net income decreased $41 million or 6%, mainly due to lower earnings from new U.K. annuity contracts as well as lower earnings reflecting the impact from the sale of our home and auto insurance manufacturing business as noted above. These items were partially offset by growth in International Insurance.

Total revenue increased $715 million or 16%, mainly due to a change of $657 million related to the fair value of investments backing our policyholder liabilities resulting from changes in long-term interest rates, largely offset in PBCAE, and the gain on the sale of RBC General Insurance Company as noted above. These factors were partially offset by lower premiums reflecting the impact of the sale of our home and auto insurance manufacturing business and the impact due to foreign exchange translation.

PBCAE increased $461 million or 16%, mainly due to a change in the fair value of investments backing our policyholder liabilities, largely offset in revenue. This factor was partially offset by lower costs reflecting the impact from the sale of our home and auto insurance manufacturing business as noted above.

Non-interest expense increased $10 million or 2%, largely in support of business growth and strategic initiatives, partially offset by reduced expenses reflecting the impact of the sale of our home and auto insurance manufacturing business, as noted above, and efficiency management activities.

Premiums and deposits were down $422 million or 8%, reflecting the impact of the sale of our home and auto insurance manufacturing business, as noted above, and a reduction related to our retrocession contracts. This was partially offset by growth in International Insurance.

Embedded value decreased $66 million, reflecting the impact of the sale of our home and auto insurance manufacturing business, as noted above, and the transfer of capital though dividends paid, largely offset by business growth. For further details, refer to the Key performance and non-GAAP measures section.

2015 vs. 2014
Net income decreased $75 million or 10% from 2014, mainly due to a change in Canadian tax legislation impacting certain foreign affiliates that became effective November 1, 2014, a lower level of favourable actuarial adjustments in 2015, and higher net claims costs. These factors were partially offset by higher earnings from new U.K. annuity contracts and the favourable impact of investment-related activities on the Canadian life business.

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

Canadian Insurance

We offer life, health, property and casualty insurance products, as well as wealth accumulation solutions, to individual and group clients across Canada. Our life and health portfolio includes universal life, term life, critical illness, disability, long-term care insurance and group benefits. We offer a wide range of property and casualty products including home, auto and travel insurance. Our travel products include out of province/ country medical coverage, and trip cancellation and interruption insurance.

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 as well as in home and auto through our distribution agreement with Aviva.

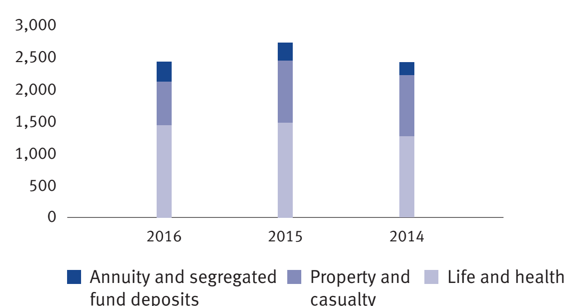
Financial performance
Total revenue increased $648 million or 24% from last year, mainly due to the fair value of investments backing our policyholder liabilities resulting from changes in long-term interest rates, largely offset in PBCAE, and the gain on sale of our home and auto insurance manufacturing business as noted above, partially offset by lower premiums reflecting the impact of the sale.

Premiums and deposits decreased $301 million or 11%, reflecting the impact of the sale of our home and auto insurance manufacturing business, as noted above.

Selected highlights **Table 33**

(Millions of Canadian dollars)	2016	2015	2014
Total revenue	$ 3,373	$ 2,725	$ 2,911
Other information			
Premiums and deposits			
Life and health	1,438	1,484	1,266
Property and casualty	674	958	951
Annuity and segregated fund deposits	312	283	202
Fair value changes on investments backing policyholder liabilities	575	54	490

Premiums and deposits (Millions of Canadian dollars)



International Insurance

International Insurance is primarily comprised of our reinsurance businesses which insure risks of other insurance and reinsurance companies. We offer life and health, accident and annuity reinsurance products.

The global reinsurance market is dominated by a few large players, with significant presence in the U.S., the U.K. and the Euro area. The reinsurance industry is competitive but barriers to entry remain high.

Financial performance
Total revenue increased $67 million or 4%, mainly due to a change in the fair value of investments backing our policyholder liabilities resulting from changes in long-term interest rates, largely offset in PBCAE. This factor was partially offset by a reduction in revenue related to our retrocession contracts, largely offset in PBCAE, and the impact due to foreign exchange translation.

Premiums and deposits decreased $121 million or 5%, driven by the reduction in premium related to our retrocession contracts, partly offset by growth in the U.K. annuity contracts.

Selected highlights **Table 34**

(Millions of Canadian dollars)	2016	2015	2014
Total revenue	$ 1,778	$ 1,711	$ 2,053
Other information			
Premiums and deposits			
Life and health	1,335	1,483	2,128
Property and casualty	–	(4)	6
Annuity	835	812	611
Fair value changes on investments backing policyholder liabilities	58	(78)	(51)

Investor & Treasury Services

Investor & Treasury Services is a specialist provider of asset services, custody, payments and treasury services for financial and other institutional investors worldwide. We deliver custodial, advisory, financing and other services to safeguard client assets, maximize liquidity, and manage risk across multiple jurisdictions. We also provide short-term funding and liquidity management for RBC. We are a global custodian with a network of offices across North America, Europe and Asia-Pacific. While we compete against the world's largest global custodians, we remain a specialist provider with a focus on asset managers offering offshore fund structures in Luxembourg and Ireland, and alternative asset managers of real estate and private equity funds. Our transaction banking business is a leading provider of Canadian dollar cash management, correspondent banking, and trade finance for financial institutions globally.

Economic and market review

The highly competitive environment in the global asset services industry continued to pressure margins. Sustained low to negative interest rates globally have reduced deposit rates, leading to margin compression from our deposit-gathering activities. Moreover, continued increases in financial services regulations have driven up compliance and technology costs. Market uncertainty (including Brexit and central bank policy rates) has impacted our core fees and foreign exchange transaction volumes; however, tightening credit spreads and favourable interest rate movements benefited our funding and liquidity business.

Highlights

- Rated by our clients the #1 global custodian for six consecutive years (Global Investor/ISF Global Custody Survey, 2016).
- Rated #1 custodian overall in Canada and Europe (excl. Switzerland and the U.K.) (R&M Investor Services Survey, 2016).
- Named #1 Canadian sub-custodian (Global Custodian Agent Banks in Major Markets Survey, 2016).
- Maintained global position as the #1 fund administrator overall for four consecutive years (R&M Fund Accounting and Administration Survey, 2016).
- Named Best Trade Finance Bank in Canada for four consecutive years (*Global Finance*, 2016).
- High level of investment in client-focused technology solutions.

Outlook and priorities

In 2017, our aim is to continue to be the leading provider of domestic asset services and cash management in Canada and a leading provider of fund services to asset managers in select offshore markets. Our focus is on driving top-line growth by leveraging our leadership position in Canada and recognized capabilities in the offshore fund services markets in Luxembourg and Ireland to win new business and deepen existing client relationships. We continue to execute on our strategic and transformational technology initiatives to enhance client experiences. While we expect the global asset services industry to remain challenging in the near-term, we are well-positioned to compete 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.

Key strategic priorities for 2017

- Maintain our position as the #1 provider of domestic custody, asset services and cash management in Canada.
- Compete as a leading provider of asset services in the major offshore fund domicile markets of Luxembourg and Ireland.
- Continue to deliver a high-level of investment in client-focused technology solutions.
- Enhance our client centric service offering and improve efficiency.

Investor & Treasury Services — Table 35

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2016	2015	2014
Net interest income	$ 825	$ 818	$ 732
Non-interest income	1,446	1,220	1,152
Total revenue (1)	2,271	2,038	1,884
Non-interest expense	1,457	1,300	1,286
Net income before income taxes	814	738	598
Net income	$ 613	$ 556	$ 441
Key Ratios			
ROE	17.9%	20.3%	19.8%
Selected average balance sheet information			
Total assets	$ 142,500	$ 125,300	$ 94,200
Deposits	134,300	139,600	112,100
Client deposits	52,800	50,400	42,700
Wholesale funding deposits	81,500	89,200	69,400
Attributed capital	3,350	2,700	2,150
Other Information			
AUA (2)	3,929,400	3,620,300	3,702,800
Average AUA	3,770,200	3,793,000	3,463,000
Number of employees (FTE)	4,776	4,774	4,963

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

(Millions of Canadian dollars, except percentage amounts)	2016 vs. 2015
Increase (decrease):	
Total revenue	$ 40
Non-interest expense	10
Net income	20
Percentage change in average US$ equivalent of C$1.00	(5)%
Percentage change in average British pound equivalent of C$1.00	5%
Percentage change in average Euro equivalent of C$1.00	(3)%

(1) Effective the third quarter of 2015, we have aligned the reporting period of Investor Services, which resulted in an additional month of earnings being included in 2015. The net impact of the additional month was recorded in revenue.
(2) Represents period-end spot balances.

Financial performance
2016 vs. 2015
Net income increased $57 million or 10%, primarily due to higher funding and liquidity earnings reflecting tightening credit spreads and favourable interest rate movements, and higher client deposit spreads. These factors were partially offset by increased investment in technology initiatives, higher staff costs and lower earnings from foreign exchange market execution. In addition, the prior year included an additional month of earnings in Investor Services of $42 million ($28 million after-tax).

Total revenue increased $233 million or 11%, mainly related to higher funding and liquidity revenue reflecting tightening credit spreads and favourable interest rate movements, increased revenue on higher client deposit spreads, and the impact from foreign exchange translation. These factors were partially offset by lower revenue from foreign exchange market execution. In addition, the prior year included the impact of an additional month in Investor Services as noted above.

Non-interest expense increased $157 million or 12%, largely reflecting increased investment in technology initiatives, higher staff costs, and the impact from foreign exchange translation.

2015 vs. 2014
Net income was up $115 million or 26% from 2014, primarily due to higher earnings from foreign exchange market execution, an additional month of earnings in Investor Services as noted above, increased custodial fees and higher earnings from growth in client deposits. These factors were partially offset by lower funding and liquidity results.

Capital Markets

Capital Markets provides public and private companies, institutional investors, governments and central banks globally with a wide range of capital markets products and services across our two main business lines, Corporate and Investment Banking and Global Markets. Our legacy portfolio 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, and structuring and trading. In Canada, we compete mainly with Canadian banks where we are a premier global investment bank and 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. Outside North America, we have a select presence in the U.K. and Europe, and Other international, where we offer a diversified set of capabilities in our key sectors of expertise such as energy, mining and infrastructure and we have a growing presence in industrial, consumer and healthcare in Europe. In the U.K. and Europe, we compete in our key sectors of expertise with global and regional investment banks. In Other international, we compete with global and regional investment banks in select products, consisting of fixed income distribution and currencies trading and corporate and investment banking in Australia, Asia and the Caribbean.

Economic and market review
Following the deterioration of market conditions throughout the latter half of fiscal 2015, the first half of 2016 was characterized by volatile debt and equity markets as well as difficult market conditions. This was driven by the effect of stronger but still lower than historical levels for global oil and commodity prices, as well as diverging monetary policies amongst global central banks. This led to decreased levels of client activity and volumes. Our corporate and investment banking businesses saw debt underwriting rebound in the latter part of the year with good activity in investment grade and a recovery in high yield. Although the market backdrop improved in the latter half of the year, equity market volatility remained through the end of the year.

Highlights
- We continued to focus on the efficient deployment of our capital and growth throughout our businesses by re-allocating capital from trading to corporate and investment banking businesses and managed risk by focusing on optimizing our trading products.
- In Canada, we maintained our market leadership by deepening our existing client relationships despite soft markets in both the energy and commodity sectors, gaining new clients by leveraging our strong global capabilities and improving collaboration with enterprise partners to drive operational efficiencies. We continued to win significant mandates including acting as lead left bookrunner on the TransCanada Pipelines $4.4 billion bought deal offering of subscription receipts in addition to being the joint bookrunner on the supporting US$3.2 billion equity bridge and the US$7.1 billion asset sale bridge.
- In the U.S., we continued to leverage our key strategic investments to expand our corporate and investment banking businesses as we optimized our lending relationships, focusing on leveraging these relationships to generate additional revenue. Despite softer investment banking fees from lighter industry-wide underwriting activity, we continued to win significant mandates including acting as joint bookrunner on the acquisition financing and financial advisor to Dell Inc. on the acquisition of EMC Corporation for US$49 billion in cash and stock transaction, joint lead arranger and joint bookrunner on the financing supporting Western Digital Corporation's US$17 billion acquisition of SanDisk, as well as acting as financial advisor, joint lead arranger and joint bookrunner on the US$12.4 billion acquisition of ADT by Protection 1 and Apollo Global Management.
- In the U.K. and Europe, we continued to focus on maintaining momentum throughout the year and improving profitability through repositioning our fixed income business, as well as growing our corporate and investment banking presence in key markets, by developing strong client relationships. We acted as sole financial adviser to Kohlberg Kravis Roberts & Co. on the sale of Coriance Group SAS, a leading French district heating concession business, to First State Investments for an undisclosed amount. The transaction represents a successful example of cross-border cooperation involving an integrated advisory team across Utilities & Renewables, France and M&A.
- In Other international, we continued to focus on our corporate and investment banking, fixed income trading distribution and foreign exchange trading capabilities.
- As a result of our successes in each of our regions, we received external recognition as an industry leader and were named or ranked:
  - Best Investment Bank in Canada (*Euromoney* Magazine) for the ninth consecutive year.
  - Best Bank for Markets in North America (*Euromoney* Magazine)
  - World's Best Developed Markets Banks (Canada) (*Global Finance*)
  - The largest investment bank in Canada by fees for the first nine months of 2016 (*Dealogic*).
  - The 10th largest investment bank globally and in the Americas by fees for the first nine months of 2016 (*Thomson Reuters*).

Outlook and priorities
Global market volatility dominated headlines for Investment Banking with the global fee pool down 10% in the first nine months of 2016 from the same period in 2015. With an improved market environment expected in 2017, our investment banking revenue is forecast to improve and healthier origination volumes should help lift secondary trading activity. We will focus on maximizing returns through business structure and continual optimization of the balance sheet, as well as improving operating leverage through cost containment initiatives. Regulatory impacts continue to make earnings growth a challenge as regulatory and tax changes constrain revenue growth and regulatory reform implementation continues to exert upward pressure on expenses and capital.

For further details, refer to our Risk management – Top and emerging risks section. For further details on our general economic outlook, refer to the Economic, market and regulatory review and outlook section.

Key strategic priorities for 2017
- Capital Markets will maintain its focus on full service activities in Canada, the U.S. and Europe.
- Maintain our leadership position in Canada by focusing on long-term client relationships, leveraging our global capabilities and continuing to improve collaboration with Wealth Management.
- Continue to expand and strengthen client relationships in the U.S. by building on our momentum through expanded origination, advisory and distribution activity, and driving cross-selling through our diversified loan book. We expect the U.S. to continue to be the world's most attractive market and it will remain Capital Markets' priority growth market.
- Build on our core strengths in Europe in both Corporate and Investment Banking and Global Markets by continuing to grow and deepen client relationships and in Asia by optimizing the performance of our existing footprint.
- 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.
- Manage through the significant changes in the regulatory environment.

Capital Markets financial highlights — Table 36

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2016	2015	2014
Net interest income (1)	$ 3,804	$ 3,970	$ 3,485
Non-interest income (1)	4,146	4,093	3,881
Total revenue (1)	7,950	8,063	7,366
PCL	327	71	44
Non-interest expense	4,466	4,696	4,344
Net income before income taxes	3,157	3,296	2,978
Net income	$ 2,270	$ 2,319	$ 2,055
Revenue by business			
Corporate and Investment Banking	$ 3,694	$ 3,697	$ 3,437
Global Markets (2)	4,361	4,477	3,896
Other (2)	(105)	(111)	33
Key ratios			
ROE	12.2%	13.6%	14.1%
Selected average balance sheet information			
Total assets	$ 508,200	$ 477,300	$ 392,300
Trading securities	104,900	116,200	103,800
Loans and acceptances	88,100	79,700	64,800
Deposits	61,500	60,300	47,600
Attributed capital	17,900	16,550	14,100
Other information			
Number of employees (FTE)	3,883	3,996	3,917
Credit information			
Gross impaired loans as a % of average net loans and acceptances	1.73%	0.37%	0.08%
PCL on impaired loans as a % of average net loans and acceptances	0.37%	0.09%	0.07%

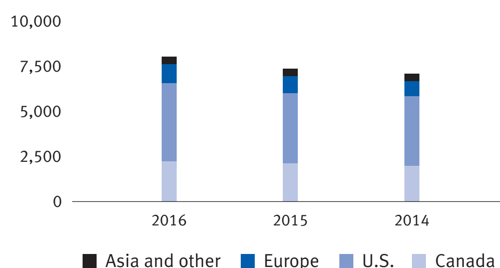
Estimated impact of U.S. dollar, British pound and Euro translation on key income statement items

(Millions of Canadian dollars, except percentage amounts and as otherwise noted)	2016 vs. 2015
Increase (decrease):	
Total revenue	$ 259
Non-interest expense	72
Net income	115
Percentage change in average US$ equivalent of C$1.00	(5)%
Percentage change in average British pound equivalent of C$1.00	5%
Percentage change in average Euro equivalent of C$1.00	(3)%

(1) The taxable equivalent basis (teb) adjustment for 2016 was $736 million (2015 – $570 million, 2014 – $492 million). For further discussion, refer to the How we measure and report our business segments section of our 2016 Annual Report.

(2) Effective the first quarter of 2015, we reclassified amounts from Global Markets to Other related to certain proprietary trading strategies which we exited in the fourth quarter of 2014 to comply with the Volcker Rule. Prior period amounts have been revised from those previously presented.

Revenue by region (Millions of Canadian dollars)



Financial performance
2016 vs. 2015

Net income decreased $49 million or 2%, driven by higher PCL, lower results in our Global Markets and Corporate and Investment Banking businesses reflecting lower client activity, and higher compliance costs. These factors were partially offset by lower variable compensation, the impact from foreign exchange translation and lower litigation provisions.

Total revenue decreased $113 million or 1%, largely reflecting lower equity trading revenue and lower lending revenue primarily in the U.S. and Europe, and lower private equity investment gains. These factors were partially offset by the impact from foreign exchange translation and higher fixed income trading revenue mainly in Europe and Canada.

PCL increased $256 million, primarily due to higher provisions in the oil & gas sector. For further details, refer to the Credit quality performance section.

Non-interest expense decreased $230 million or 5%, reflecting lower variable compensation largely due to changes in the deferral policy of the compensation plan and lower litigation provisions, partially offset by the impact from foreign exchange translation and higher compliance costs.

2015 vs. 2014
Net income increased $264 million or 13% from 2014, driven by growth in our Global Markets business mainly reflecting increased client activity, continued solid performance in our Corporate and Investment Banking business, and the impact from foreign exchange translation. These factors were partially offset by lower results in certain legacy portfolios.

Business line review

Corporate and Investment Banking

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

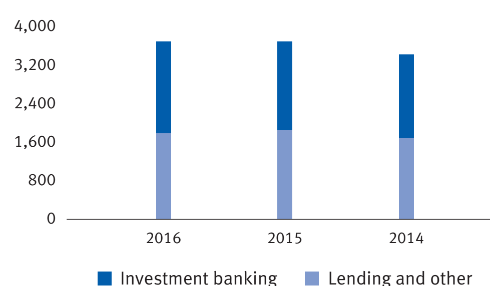
Financial performance
Corporate and Investment Banking revenue of $3,694 million decreased $3 million as compared to last year.
Investment banking revenue increased $59 million or 3%, primarily due to growth in Municipal Banking in the U.S. and higher M&A activity across most regions, partially offset by lower private equity investment gains and lower equity origination activity largely in the U.S.
Lending and other revenue decreased $62 million or 3%, due to lower spreads across most regions.

Selected highlights — **Table 37**

(Millions of Canadian dollars)	2016	2015	2014
Total revenue (1)	$ 3,694	$ 3,697	$ 3,437
Breakdown of revenue (1)			
Investment banking	1,892	1,833	1,736
Lending and other (2)	1,802	1,864	1,701
Other information			
Average assets	73,200	63,900	49,500
Average loans and acceptances	65,300	56,200	42,500

(1) The teb adjustment for 2016 was $279 million (2015 – $25 million, 2014 – $13 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.

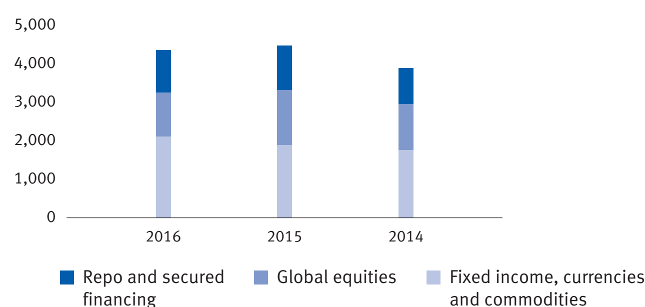
Financial performance
Total revenue of $4,361 million decreased $116 million or 3% as compared to last year.
Revenue in our Fixed income, currencies and commodities business increased $226 million or 12%, mainly due to higher fixed income and foreign exchange trading revenue, partially offset by lower debt origination activity across all regions.
Revenue in our Equities business decreased $288 million or 20%, primarily due to lower equity trading revenue across most regions and lower volume in our cash equities businesses.
Revenue in our Repo and secured financing business decreased $54 million or 5%, mainly due to lower trading revenue reflecting decreased client activity.

Selected highlights — **Table 38**

(Millions of Canadian dollars)	2016	2015 (1)	2014 (1)
Total revenue (2)	$ 4,361	$ 4,477	$ 3,896
Breakdown of revenue (2)			
Fixed income, currencies and commodities	2,113	1,887	1,760
Equities	1,147	1,435	1,204
Repo and secured financing (3)	1,101	1,155	932
Other information			
Average assets	472,100	494,400	366,000

(1) Amounts have been revised from those previously presented.
(2) The teb adjustment for 2016 was $457 million (2015 – $545 million, 2014 – $470 million). For further discussion, refer to the How we measure and report our business segments section.
(3) 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 consists of our bank-owned life insurance (BOLI) stable value products, U.S. commercial mortgage-backed securities, U.S. auction rate securities (ARS), and structured rates in Asia. In recent years, in order to optimize our capital employed to improve our risk-adjusted returns and reduce our liquidity risk on various products, we have significantly reduced several of our legacy portfolios. Our legacy portfolio assets decreased by 3% as compared to last year.

Financial performance
Revenue increased $6 million as compared to last year.

Corporate Support

Corporate Support comprises 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 39

(Millions of Canadian dollars, except as otherwise noted)	2016	2015	2014
Net interest income (loss) (1)	$ (390)	$ (514)	$ (313)
Non-interest income (loss) (1)	(202)	210	164
Total revenue (1)	(592)	(304)	(149)
PCL	51	(3)	(2)
Non-interest expense	30	125	89
Net income (loss) before income taxes (1)	(673)	(426)	(236)
Income taxes (recoveries) (1)	(691)	(824)	(405)
Net income (loss) (2)	$ 18	$ 398	$ 169
Other information			
Number of employees (FTE) (3)	13,913	13,371	12,540

(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, 2016 was $44 million (October 31, 2015 – $94 million; October 31, 2014 – $93 million).
(3) Amounts have been revised from previously presented.

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, 2016 was $736 million as compared to $570 million last year and $492 million for the year ended October 31, 2014.

In addition to the teb impacts noted above, the following identifies the other material items affecting the reported results in each period.

2016
Net income was $18 million largely reflecting asset/liability management activities, partially offset by net unfavourable tax adjustments and a $50 million ($37 million after-tax) increase in the provision for loans not yet identified as impaired.

2015
Net income was $398 million largely reflecting net favourable tax adjustments, asset/liability management activities, a gain of $108 million (before- and after-tax) from the wind-up of a U.S.-based funding subsidiary that resulted in the release of CTA, and a gain on sale of a real estate asset. These factors were partially offset by transaction costs related to our acquisition of City National.

2014
Net income was $169 million largely reflecting asset/liability management activities and gains on private equity investments mainly related to the sale of a legacy portfolio, partially offset by net unfavourable tax adjustments.

Results by geographic segment (1)

For geographic reporting, our segments are grouped into the following: Canada, U.S., and Other International. Transactions are primarily recorded in the location that best reflects the risk due to negative changes in economic conditions and prospects for growth due to positive economic changes. The following table summarizes our financial results by geographic region:

Table 40

	2016				2015				2014			
(Millions of Canadian dollars)	Canada	U.S.	Other International	Total	Canada	U.S.	Other International	Total	Canada	U.S.	Other International	Total
Net interest income	$ 11,685	$ 3,241	$ 1,605	$ 16,531	$ 11,538	$ 1,977	$ 1,256	$ 14,771	$ 11,128	$ 1,697	$ 1,291	$ 14,116
Non-interest income	12,054	4,992	4,828	21,874	10,889	4,619	5,042	20,550	10,488	4,257	5,247	19,992
Total revenue	$ 23,739	$ 8,233	$ 6,433	$ 38,405	$ 22,427	$ 6,596	$ 6,298	$ 35,321	$ 21,616	$ 5,954	$ 6,538	$ 34,108
PCL	1,231	254	61	1,546	933	98	66	1,097	922	52	190	1,164
PBCAE	2,304	–	1,120	3,424	1,976	–	987	2,963	2,188	1	1,384	3,573
Non-interest expense	10,229	6,151	3,756	20,136	10,139	4,762	3,737	18,638	9,650	4,199	3,812	17,661
Income taxes	2,158	397	286	2,841	1,727	649	221	2,597	1,983	660	63	2,706
Net income	$ 7,817	$ 1,431	$ 1,210	$ 10,458	$ 7,652	$ 1,087	$ 1,287	$ 10,026	$ 6,873	$ 1,042	$ 1,089	$ 9,004

(1) For further details, refer to Note 30 of our audited 2016 Annual Consolidated Financial Statements.

2016 vs. 2015

Net income in Canada was up $165 million or 2% from the prior year, mainly due to higher earnings from growth in average fee-based client assets in Wealth Management, the gain on sale of our home and auto insurance manufacturing business, and volume and fee-based revenue growth across most businesses in Canadian Banking. These factors were partially offset by higher PCL, increased investment in technology, and higher costs to support business growth. In addition, the prior year benefited from a lower effective tax rate reflecting net favourable income tax adjustments, as well as a gain from the wind-up of a U.S. subsidiary.

U.S. net income increased $344 million or 32% compared to last year, largely reflecting lower taxes, the inclusion of earnings from our acquisition of City National, and lower variable compensation in Capital Markets. This was partly offset by lower equity trading and lending earnings and higher PCL.

Other International net income was down $77 million or 6% from the prior year, mainly due to higher costs to support business growth in Investor & Treasury Services and in the Caribbean, lower earnings from new U.K. annuity contracts in Insurance, and the exit of certain international businesses in Wealth Management. This was partially offset by higher fixed income trading results and increased M&A activity in Capital Markets, higher funding and liquidity earnings in Investor & Treasury Services reflecting tightening credit spreads and favourable interest rate movements, the impact from foreign exchange translation and higher fee-based revenue in the Caribbean.

2015 vs. 2014

Net income in Canada was up $779 million or 11% as compared to 2014, mainly due to solid volume growth and strong fee-based revenue growth across most businesses in Canadian Banking, a lower effective tax rate reflecting net favourable income tax adjustments, and higher earnings in Investor & Treasury Services. A gain of $108 million (before- and after-tax) from the wind-up of a U.S.-based funding subsidiary that resulted in the release of CTA also contributed to the increase. These factors were partially offset by higher costs in support of business growth, and lower spreads.

U.S. net income was up $45 million or 4% as compared to 2014, primarily due to the impact from foreign exchange translation, growth in our global markets businesses reflecting increased client activity and more favourable market conditions in the first half of 2015, and higher results in most corporate and investment banking businesses. Lower litigation provisions and related legal costs in Capital Markets also contributed to the increase. These factors were partially offset by higher costs in support of business growth.

Other International net income was up $198 million or 18% as compared to 2014, mainly due to lower PCL in our Caribbean portfolios, and higher lending activity in Europe. These factors were partially offset by restructuring costs related to our International Wealth Management business. In addition, our results in 2014 were unfavourably impacted by a loss of $100 million (before- and after-tax) related to the sale of RBC Jamaica and a provision of $40 million ($32 million after-tax) related to post-employment benefits and restructuring charges in the Caribbean.

Quarterly financial information

Fourth quarter 2016 performance

Q4 2016 vs. Q4 2015

Fourth quarter net income of $2,543 million was down $50 million or 2% from last year. Diluted EPS of $1.65 was down $0.09 and ROE of 15.5% was down 240 bps. Our fourth quarter earnings decreased as lower results in Capital Markets were mostly offset by strong earnings in Wealth Management and Investor & Treasury Services, and higher earnings in Personal & Commercial Banking and Insurance. In addition, the prior year benefited from net favourable tax adjustments.

Total revenue increased $1,246 million or 16%, mainly due to the inclusion of City National, which contributed $543 million (US$411 million), the change in the fair value of investments backing our policyholder liabilities, largely offset in PBCAE, and higher fixed income trading revenue and strong debt and equity origination activity. Higher funding and liquidity revenue reflecting tightening credit spreads and favourable interest rate movements, increased loan syndication revenue, and solid volume growth across most businesses in Canadian Banking also contributed to the increase. These factors were partially offset by lower equity trading revenue across most regions and lower premiums reflecting the impact of the sale of our home and auto insurance manufacturing business.

Total PCL increased $83 million and the PCL ratio of 27 bps increased 4 bps from last year, mainly reflecting higher provisions in our Canadian personal and commercial lending portfolios and higher write-offs in our Canadian credit cards portfolio. Higher provisions, net of recoveries, in the energy sector in Capital Markets also contributed to the increase.

PBCAE increased $105 million or 36%, largely reflecting the change in fair value of investments backing our policyholder liabilities, largely offset in revenue, and growth mainly in International Insurance. These factors were partially offset by the impact from the sale of our home and auto insurance manufacturing business as noted above.

Non-interest expense increased $551 million or 12%, primarily reflecting the inclusion of our acquisition of City National, which increased expenses by $440 million, including $49 million related to the amortization of intangibles and $16 million related to integration costs. Higher variable compensation on improved results in Capital Markets and Wealth Management, and higher costs in support of business growth also contributed to the increase. These factors were partially offset by continuing benefits from our efficiency management activities and lower costs as a result of the sale of the home and auto insurance manufacturing business as noted above. The prior year also included restructuring costs largely related to our International Wealth Management business, including the sale of RBC Suisse.

Income tax expense increased $557 million from last year, and the effective income tax rate increased from 7.6% last year to 23.2%, as the prior year included net favourable tax adjustments mainly in Corporate Support and Capital Markets.

Q4 2016 vs. Q3 2016

Net income of $2,543 million decreased $352 million, or 12% compared to the prior quarter. The prior quarter included a gain of $287 million ($235 million after-tax) on the sale of our home and auto insurance manufacturing business. Lower earnings in Capital Markets mainly due to lower fixed income and equity trading results, and lower earnings in Personal & Commercial Banking largely driven by higher technology spend and seasonally higher marketing costs in support of business growth also contributed to the decrease. These factors were partially offset by strong earnings in Insurance mainly due to favourable actuarial adjustments reflecting management actions and assumption changes, and strong earnings in Investor & Treasury Services largely driven by higher funding and liquidity revenue reflecting tightening credit spreads and favourable interest rate movements.

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 41**

	2016				2015			
(Millions of Canadian dollars, except per share and percentage amounts)	Q4	Q3	Q2	Q1	Q4	Q3	Q2	Q1
Net interest income	$ 4,187	$ 4,123	$ 4,025	$ 4,196	$3,800	$ 3,783	$ 3,557	$ 3,631
Non-interest income	5,078	6,132	5,501	5,163	4,219	5,045	5,273	6,013
Total revenue	$ 9,265	$10,255	$ 9,526	$ 9,359	$8,019	$ 8,828	$ 8,830	$ 9,644
PCL	358	318	460	410	275	270	282	270
PBCAE	397	1,210	988	829	292	656	493	1,522
Non-interest expense	5,198	5,091	4,887	4,960	4,647	4,635	4,736	4,620
Net income before income taxes	$ 3,312	$ 3,636	$ 3,191	$ 3,160	$2,805	$ 3,267	$ 3,319	$ 3,232
Income taxes	769	741	618	713	212	792	817	776
Net income	$ 2,543	$ 2,895	$ 2,573	$ 2,447	$2,593	$ 2,475	$ 2,502	$ 2,456
EPS – basic	$ 1.66	$ 1.88	$ 1.67	$ 1.59	$ 1.74	$ 1.66	$ 1.68	$ 1.66
– diluted	1.65	1.88	1.66	1.58	1.74	1.66	1.68	1.65
Segments – net income (loss)								
Personal & Commercial Banking	$ 1,275	$ 1,322	$ 1,297	$ 1,290	$1,270	$ 1,281	$ 1,200	$ 1,255
Wealth Management	396	388	386	303	255	285	271	230
Insurance	228	364	177	131	225	173	123	185
Investor & Treasury Services	174	157	139	143	88	167	159	142
Capital Markets	482	635	583	570	555	545	625	594
Corporate Support	(12)	29	(9)	10	200	24	124	50
Net income	$ 2,543	$ 2,895	$ 2,573	$ 2,447	$2,593	$ 2,475	$ 2,502	$ 2,456
Effective income tax rate	23.2%	20.4%	19.4%	22.6%	7.6%	24.2%	24.6%	24.0%
Period average US$ equivalent of C$1.00	$ 0.757	$ 0.768	$ 0.768	$ 0.728	$0.758	$ 0.789	$ 0.806	$ 0.839

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

Seasonality

Seasonal factors may impact our results in certain quarters. The first quarter has historically been seasonally 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 and investment management businesses.

Specified items affecting our consolidated results

- In the third quarter of 2016, our results included a gain of $287 million ($235 million after-tax) related to the sale of RBC General Insurance Company to Aviva Canada Inc.
- In the second quarter of 2015, our results included a gain of $108 million (before- and after-tax) from the wind-up of a U.S.-based subsidiary that resulted in the release of a foreign currency translation adjustment that was previously booked in other components of equity.

Trend analysis

The Canadian economy has generally improved over the period expanding in the first half of calendar 2016 due to solid consumer spending and housing activity, reflecting low interest rates and a resilient labour market. However, business investment remained weak and was compounded by the Alberta wildfires which temporarily halted oil production in the region. The U.S. economy has generally seen growth over the period,

experiencing modest growth in the second calendar quarter of 2016 boosted by robust consumer spending reflecting solid job growth and rising wages, offset by declines in business and residential investment. Global markets recorded minimal gains this year amid several periods of heightened volatility related to global growth concerns. For further details, refer to the Economic and market review and outlook section.

Earnings have generally trended upwards over the period, driven by volume growth partially offset by lower spreads and higher fee-based revenue in our Canadian Banking businesses, as well as higher earnings from growth in average fee-based client assets reflecting strong net sales and capital appreciation in Wealth Management driven by improved market conditions. Results of our acquisition of City National have been reflected in our Wealth Management segment since the first quarter of 2016. Capital Markets results have remained relatively stable over the period, declining in the fourth quarter of 2016 primarily due to lower trading revenue largely in the U.S. and Europe, and lower equity origination activity in Canada. Results in our Insurance segment were impacted by the gain on the sale of RBC General Insurance Company in the third quarter of 2016. Investor & Treasury Services results have fluctuated over the period, and in the third quarter of 2015 benefited from an additional month of earnings in Investor Services. Higher funding and liquidity earnings reflecting tightening credit spreads and favourable interest rate movements contributed to the increase in the fourth quarter of 2016.

Revenue has generally increased over the period reflecting solid volume and fee-based revenue growth in our Canadian Banking businesses, as well as growth in average fee-based client assets in Wealth Management. Wealth Management revenue has reflected the inclusion of our acquisition of City National since the first quarter of 2016. Trading revenue has generally trended upwards over the period, and has fluctuated since the second half of 2015 reflecting widening credit spreads, which stabilized in the first quarter of 2016, and lower client activity. Net interest income has trended upwards over the period, largely due to solid volume growth across our Canadian Banking businesses, higher trading-related net interest income, and the inclusion of City National since the first quarter of 2016. Over the period, the impact from foreign exchange translation due to a generally weaker Canadian dollar has also contributed to the increase in revenue. Insurance revenue was primarily impacted by changes in the fair value of investments backing our policyholder liabilities, which is largely offset in PBCAE.

The credit quality of our portfolios has generally remained stable over the period, with an increase in 2016 to PCL recorded in our Capital Markets and Canadian Banking businesses mainly reflecting the impact of the sustained low oil price environment.

PBCAE has fluctuated quarterly as it includes the changes to the fair value of investments backing our policyholder liabilities, which is largely offset in revenue. PBCAE has also increased due to business growth, and has been impacted by actuarial liability adjustments and claims costs over the period.

While we continue to focus on efficiency management activities, non-interest expense has generally trended upwards over the period, mostly to support business growth and due to the inclusion of City National since the first quarter of 2016. Over the period, non-interest expense also increased due to higher compliance costs as well as the impact from foreign exchange translation.

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, principally Canadian taxable corporate dividends. Our effective income tax rate has generally been impacted over the period by higher earnings before income taxes, increased earnings in higher tax jurisdictions, and by net favourable tax adjustments.

Financial condition

Condensed balance sheets

The following table shows our condensed balance sheet:

Table 42

(Millions of Canadian dollars)	2016	2015	2014
Assets (1)			
Cash and due from banks	$ 14,929	$ 12,452	$ 17,421
Interest-bearing deposits with banks	27,851	22,690	8,399
Securities	236,093	215,508	199,148
Assets purchased under reverse repurchase agreements and securities borrowed	186,302	174,723	135,580
Loans			
Retail	369,470	348,183	334,269
Wholesale	154,369	126,069	102,954
Allowance for loan losses	(2,235)	(2,029)	(1,994)
Segregated fund net assets	981	830	675
Other – Derivatives	118,944	105,626	87,402
– Other	73,554	70,156	56,696
Total assets	$ 1,180,258	$ 1,074,208	$ 940,550
Liabilities (1)			
Deposits	$ 757,589	$ 697,227	$ 614,100
Segregated fund liabilities	981	830	675
Other – Derivatives	116,550	107,860	88,982
– Other	223,764	196,985	174,431
Subordinated debentures	9,762	7,362	7,859
Total liabilities	1,108,646	1,010,264	886,047
Equity attributable to shareholders	71,017	62,146	52,690
Non-controlling interests	595	1,798	1,813
Total equity	71,612	63,944	54,503
Total liabilities and equity	$ 1,180,258	$ 1,074,208	$ 940,550

(1) Foreign currency-denominated assets and liabilities are translated to Canadian dollars.

2016 vs. 2015
Total assets were up $106 billion or 10% from last year. Foreign exchange translation decreased total assets by $4 billion.

Interest-bearing deposits with banks increased $5 billion, largely reflecting higher deposits with the Federal Reserve.

Securities were up $21 billion or 10% compared to last year, largely driven by our acquisition of City National, and higher corporate and government debt securities reflecting our management of liquidity and funding risk and increased client activities, partially offset by lower equity trading positions in support of business activities.

Assets purchased under reverse repurchase agreements (reverse repos) and securities borrowed increased $12 billion or 7%, mainly attributable to higher client activity.

Loans were up $50 billion or 10%, largely due to our acquisition of City National, and continued solid volume growth in residential mortgages and wholesale loans reflecting increased client activity.

Derivative assets were up $13 billion or 13%, mainly attributable to higher fair values on foreign exchange contracts and interest rate swaps, partially offset by higher financial netting and the impact from foreign exchange translation.

Other assets were up $3 billion or 5%, largely reflecting higher goodwill and intangible assets related to our acquisition of City National.

Total liabilities were up $98 billion or 10% from last year. Foreign exchange translation decreased total liabilities by $4 billion.

Deposits increased $60 billion or 9%, mainly driven by our acquisition of City National and growth in retail deposits largely reflecting increased client demand.

Derivative liabilities were up $9 billion or 8%, mainly attributable to higher fair values on foreign exchange contracts and interest rate swaps, partially offset by higher financial netting and the impact from foreign exchange translation.

Other liabilities increased $27 billion or 14%, mainly reflecting higher obligations related to repurchase agreements driven by increased business and client activities.

Total equity increased $8 billion or 12%, largely reflecting earnings, net of dividends, and the issuance of common shares related to our acquisition of City National.

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 effectively 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, residential and commercial mortgage loans and bond participation certificates primarily to diversify our funding sources, enhance our liquidity position and for capital purposes. We also securitize residential and commercial mortgage loans for sales and trading activities.

We securitize our credit card receivables, on a revolving basis, through a consolidated structured entity. We securitize our single and multiple-family residential mortgages through the National Housing Act Mortgage-Backed Securities (NHA MBS) program. The mortgages associated with these securitization activities are recorded on our Consolidated Balance Sheets as they do not meet the derecognition criteria. We also securitize mortgages which we purchased from third party lenders. We derecognize these purchased mortgages from our Consolidated Balance Sheets when all the risks and rewards related to these mortgages have been substantially transferred. During 2016, no purchased mortgages were derecognized. During 2015, $967 million of purchased mortgages were derecognized where both the NHA MBS and the residual interests in the mortgages were sold to third parties resulting in the transfer of substantially all of the risks and rewards. For additional details of our securitization activities, refer to Note 6 and Note 7 of our audited 2016 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 2016, there were no securitization activities associated with residential mortgage loans for the Canadian social housing program (2015 – $112 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 risk and rewards of ownership of the securitized assets. During 2016, we securitized $700 million of commercial mortgages (2015 - $195 million). Our continuing involvement with the transferred assets is limited to servicing certain of the underlying commercial mortgages sold. As at October 31, 2016, there were $1.3 billion of commercial mortgages outstanding that we continue to service related to these securitization activities (October 31, 2015 – $1.1 billion).

In prior years, we participated in bond securitization activities where we purchased government, government related and corporate bonds and repackaged those bonds in trusts that issue participation certificates, which were sold to third party investors. Securitized bonds are derecognized from our Consolidated Balance Sheets as we have transferred substantially all of the risk and rewards of ownership of the securitized assets. We did not securitize bond participation certificates during 2016 or 2015. Our continuing involvement with the transferred assets is limited to servicing the underlying bonds. As at October 31, 2016, there were $81 million of bond participation certificates outstanding related to these prior period securitization activities (October 31, 2015 – $138 million).

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 client's 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 audited 2016 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. We are involved in these conduit markets because our clients value these transactions. Our clients primarily use 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. Fee revenue for all such services amounted to $252 million during the year (2015 – $213 million). We do not maintain any ownership in these multi-seller conduits and have no rights to, or control of, their assets.

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 43**

	2016				2015			
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	$ 39,462	$ 36,494	$ 733	$ 37,227	$ 37,770	$ 34,163	$ 764	$ 34,927
Credit enhancement facilities	2,235	2,235	–	2,235	2,974	2,843	–	2,843
Total	$ 41,697	$ 38,729	$ 733	$ 39,462	$ 40,744	$ 37,006	$ 764	$ 37,770

(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 $11 million (2015 – $19 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 audited 2016 Annual Consolidated Financial Statements for more details.

As at October 31, 2016, the notional amount of backstop liquidity facilities we provide increased by $1,692 million or 4% from last year. The increase in the amount of backstop liquidity facilities provided to the multi-seller conduits as compared to last year reflects increases in the foreign exchange translation and the outstanding securitized assets of the multi-seller conduits. The notional amount of partial credit enhancement facilities we provide decreased by $739 million from last year. The decrease in the credit enhancement facilities reflects fewer transactions requiring program-level credit enhancement due to support provided directly to those transactions and decreased client usage. Total loans extended to the multi-seller conduits under the backstop liquidity facilities decreased by $31 million from last year primarily due to principal repayments which were partially offset by the impact of foreign exchange translation.

Maximum exposure to loss by client type — **Table 44**

	2016			2015		
As at October 31 (Millions)	**(US$)**	**(C$)**	**Total (C$)**	(US$)	(C$)	Total (C$)
Outstanding securitized assets						
Credit cards	$ 5,057	$ 510	$ 7,292	$ 4,679	$ 510	$ 6,628
Auto loans and leases	9,489	2,646	15,372	8,606	2,352	13,604
Student loans	2,352	–	3,154	3,473	–	4,541
Trade receivables	2,002	51	2,736	2,175	112	2,956
Asset-backed securities	547	–	734	584	–	764
Equipment receivables	1,428	–	1,915	1,362	–	1,781
Consumer loans	1,470	–	1,971	706	–	923
Dealer floor plan receivables	760	903	1,922	1,261	903	2,552
Fleet finance receivables	914	306	1,532	441	377	954
Insurance premiums	–	163	163	128	153	320
Residential mortgages	–	1,122	1,122	–	1,020	1,020
Transportation finance	1,041	153	1,549	1,204	153	1,727
Total	$ 25,060	$ 5,854	$ 39,462	$ 24,619	$ 5,580	$ 37,770
Canadian equivalent	$ 33,608	$ 5,854	$ 39,462	$ 32,190	$ 5,580	$ 37,770

Our overall exposure increased by 4% compared to last year, reflecting an increase in the outstanding securitized assets of the multi-seller conduits and foreign exchange translation. Correspondingly, total assets of the multi-seller conduits increased by $1,659 million or 4% over last year, primarily due to increases in the Auto loans and leases, Consumer loans and Credit cards asset classes, which were partially offset by decreases in the Student loans and Dealer floor plan 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 two U.S. multi-seller conduits are reviewed by Moody's Investors Service (Moody's), Standard & Poor's (S&P) and Fitch Ratings (Fitch). One U.S. multi-seller conduit is reviewed by S&P. 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, 2016, the total asset-backed commercial paper (ABCP) issued by the conduits amounted to $24.7 billion, a decrease of $790 million or 3% from last year. The decrease in the amount of ABCP issued by the multi-seller conduits compared to last year is primarily due to a decrease in client usage partially offset by foreign exchange translation. The rating agencies that rate the ABCP rated 67% (October 31, 2015 – 71%) of the total amount issued within the top ratings category and the remaining amount in the second highest ratings category.

In October 2014, the U.S. federal regulators adopted regulations related to the credit risk retention requirements of Section 15G of the Securities Exchange Act of 1934 (as added by Section 941 of the Dodd-Frank Act) for asset-backed securities (the Risk Retention Rules). To comply with the Risk Retention Rules, we plan to hold, on each day on and after December 24, 2016, ABCP from RBC administered U.S. multi-seller conduits in an amount equal to at least 5% of the aggregate principal amount of the then outstanding ABCP and any advances under the liquidity loan agreement. As at October 31, 2016, the fair value of the ABCP purchased in anticipation of the Risk Retention Rules was $670 million (October 31, 2015 – $nil). Based on the current outstanding amount of ABCP issued, we expect to hold approximately $1.2 billion of ABCP by December 24, 2016. This inventory is classified as Securities – Available-for-sale on our Consolidated Balance Sheet.

We also purchase ABCP issued by the multi-seller conduits in our capacity as a placement agent in order to facilitate overall program liquidity. As at October 31, 2016, the fair value of our inventory was $5 million, a decrease of $12 million from last year. The fluctuations in inventory held reflect normal trading activity. This inventory is classified as Securities – Trading on our Consolidated Balance Sheets.

Structured finance

We invest in 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, 2016 was $549 million (October 31, 2015 – $546 million). The increase in our maximum exposure to loss is primarily related to the impact of foreign exchange translation. Interest income from the ARS investments, which is reported in Net-interest income, was $6.3 million during the year (2015 – $6.9 million).

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, 2016, our maximum exposure to loss from these unconsolidated municipal bond TOB trusts was $1,640 million (October 31, 2015 – $856 million). The increase in our maximum exposure to loss relative to last year is primarily due to the addition of new trusts and the impact of foreign exchange translation. Fee revenue from provision of liquidity facilities to these entities reported in Non-interest income was $4.7 million during the year (2015 – $3.7 million).

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. A portion of the proceeds from the sale of the term collateralized loan obligations is used to fully repay the senior warehouse financing that we provide. As at October 31, 2016, our maximum exposure to loss associated with the outstanding senior warehouse financing facilities was $141 million (October 31, 2015 – $444 million). The decrease in our maximum exposure to loss relative to last year is related to the issuance of term collateralized loan obligations where a portion of the proceeds were used to repay some of the senior warehouse financing that we provided and a decrease in the outstanding drawings on certain 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, 2016, our maximum exposure to loss was $2.6 billion (October 31, 2015 – $2.6 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, 2016, our maximum exposure to these funds was $764 million (October 31, 2015 – $744 million). The increase in our maximum exposure compared to last year is primarily due to the impact of foreign exchange translation.

Third-party securitization vehicles

We hold interests in certain unconsolidated third-party securitization vehicles, which are structured entities. We, as well as other financial institutions, are obligated to provide funding to these entities up to our maximum commitment level and are exposed to credit losses on the underlying assets after various credit enhancements. As at October 31, 2016, our maximum exposure to loss in these entities was $9 billion (October 31, 2015 – $9.7 billion). The decrease in our maximum exposure to loss compared to last year reflects a reduction in the securitized assets in these entities partially offset by foreign currency translation. Interest and non-interest income earned in respect of these investments was $95 million (2015 – $56 million).

Guarantees, retail and commercial commitments

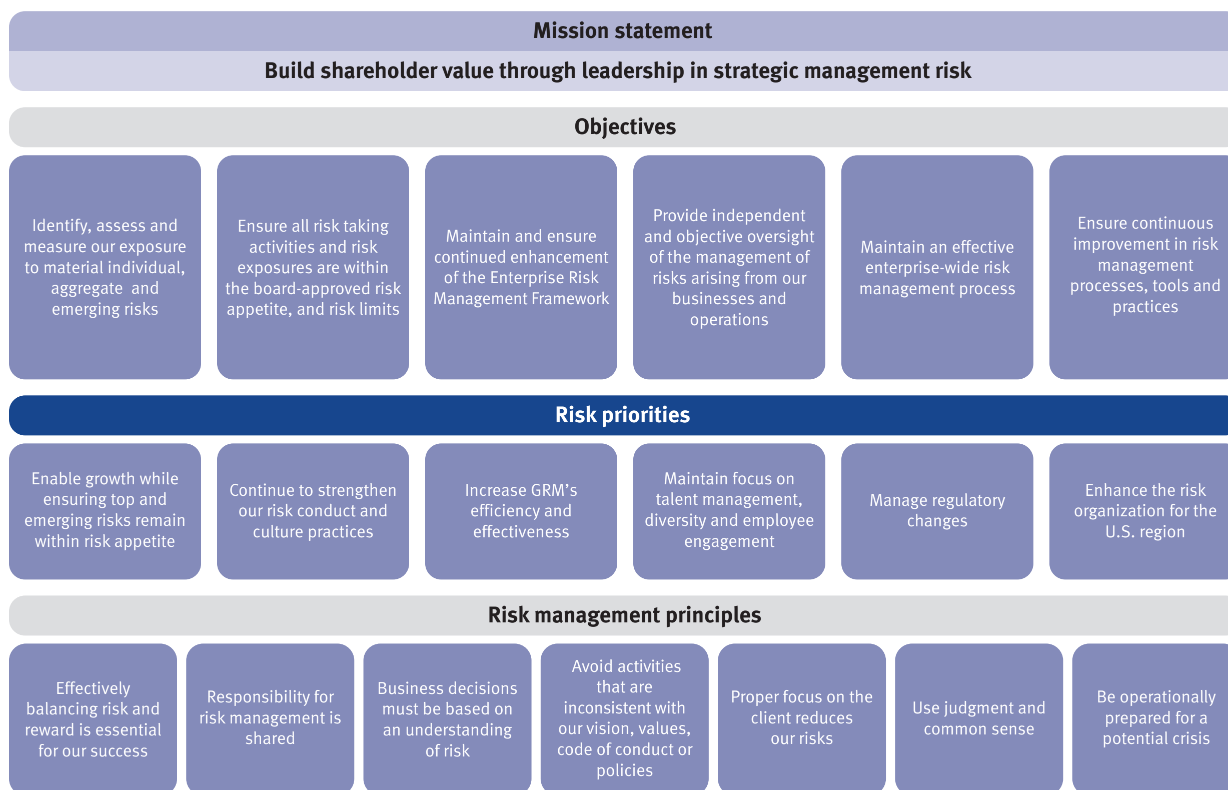
We provide guarantees and commitments to our clients that expose us to liquidity and funding risks. Our maximum potential amount of future payments in relation to our commitments and guarantee products as at October 31, 2016 amounted to $340 billion compared to $315 billion last year. The increase compared to last year relates primarily to business growth, the acquisition of City National, and the impact of foreign exchange translation in other credit-related commitments and securities lending indemnifications. Refer to Liquidity and funding risk and Note 26 to our audited 2016 Annual Consolidated Financial Statements for details regarding our guarantees and commitments.

Risk management

Overview

The ability to manage risk well is a core competency at RBC, and is supported by our strong risk conduct and culture, and an effective risk management approach. We define risk as the potential for loss or an undesirable outcome with respect to volatility of actual earnings in relation to expected earnings, capital adequacy or liquidity. Organizational design and governance processes ensure that our Group Risk Management (GRM) function is independent from the businesses it supports.

We manage our risks by ensuring 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 throughout RBC, through adherence to our Enterprise Risk Appetite Framework. Our major risk categories include credit, market, liquidity, insurance, operational, regulatory compliance, strategic, reputation, legal and regulatory environment, competitive, and systemic risks. In order to avoid excessive concentration of risks, we strive to diversify our business lines, products and sector exposures.

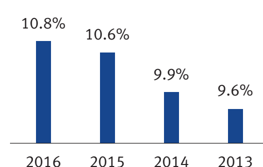


2016 Accomplishments

Throughout 2016, we have:

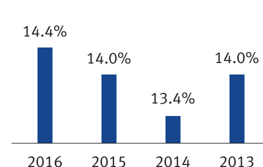
- Kept our risk profile within our risk appetite;
- Maintained strong credit quality, notwithstanding sustained low energy prices impacting the oil & gas sector and oil-exposed regions;
- Maintained strong capital and liquidity ratios;
- Avoided major operational risk events;
- Enhanced stress testing capabilities and risk analysis frameworks;
- Increased focus on further strengthening risk conduct and culture; and
- Enhanced the risk organization for the U.S.

CET1 ratio



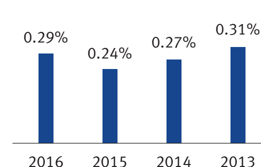
Our capital position was strong with a Basel III CET1 ratio well in excess of regulatory requirements

Total Capital ratio



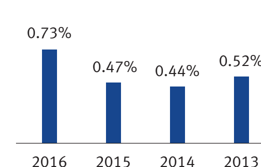
Our total capital ratio increased relative to last year mainly due to strong internal capital generation

Total PCL ratio



Our total PCL ratio remained within historical norms, up modestly compared to last year primarily as a result of the low oil price environment

GIL ratio



The quality of our credit portfolio remained high, notwithstanding the low oil prices, which led to higher impaired loans in the oil and gas sector

Top and emerging risks

Our view of risks is not static. An important component of our enterprise risk management approach is to ensure that continuously evolving top risks and emerging risks are appropriately identified, managed, and incorporated into existing enterprise risk management assessment, measurement, monitoring and escalation processes.

These practices ensure management is forward-looking in its assessment of risks to the organization. Identification of top and emerging risks occurs in the course of business development and as part of the execution of risk oversight responsibilities by GRM, Finance, Corporate Treasury, Global Compliance and other control functions.

Top and emerging risks occur as a result of exogenous factors, such as changes in the macroeconomic or regulatory environment, or endogenous factors, such as changes to our strategic imperatives, or failure to adapt to an evolving competitive or operational environment.

A top risk is an existing, significant risk that can potentially affect our earnings or capital within a one-year time horizon.

An emerging risk has a lower probability of occurring within a one-year horizon, but, in the event it materializes, can have a significant adverse impact on our ability to achieve our goals. Emerging risks are defined as "new" risks, "familiar risks in new or unfamiliar conditions", or "existing risks that are expected to increase in significance" that have the potential of creating new or changing top risks within the next annual reporting cycle that may or could prevent us from achieving our business objectives.

Top Risks	Trend	Commentary
▶ *Risk did not increase in 2016*	▲ *Risk heightened during 2016*	▲ *Top Risk in 2016*
Global uncertainty	▲	Uncertainty around the potential for a global recession remained heightened during 2016. Concerns remain around the social, political and economic impacts of mass immigration in continental Europe led by the Middle East's changing political landscape, Russia-Ukraine tension and territorial disputes between Japan and China. Increasing income inequality, unemployment and decline in living standards against the backdrop of growing foreign ownership of strategic assets is driving an increase in nationalism and extremist political movements around the globe. Slow global growth and the attempts of central banks around the world to use monetary policy to stimulate their economies, even using negative interest rates, remains a key risk. Following the recent U.S. election, drastic policy changes including trade and fiscal policy, could be a key risk that may result in economic uncertainty for the U.S. and its trading partners, including Canada.
Brexit	▲	The Brexit vote has resulted in increased concerns about the economic, legal, political, regulatory and trade consequences for the U.K. and Europe. We will be monitoring negotiations between the U.K., the EU and individual member states closely to assess the potential impacts to our business strategy in the U.K. and in Europe.
Oil & gas	▶	The oil & gas sector experienced a partial recovery during 2016, easing pressure on Provision for Credit Losses (PCL) in the latter half of the year. However, the risks associated with sustained low oil prices remain. The low oil prices might lead to additional PCL in the longer term. We have performed a number of low oil price stress tests, which focus specifically on the impact to our retail and wholesale portfolios. In our view, our exposure to weak oil and gas prices remains within our risk appetite.
Cyber risk	▲	Information and cybersecurity continue to be an increasingly problematic issue, not only for the financial services sector, but for other industries in Canada and around the globe. The volume and sophistication of cyber-attacks in the industry continue to increase and adversaries are becoming more organized. We continue to see challenges in the management of IT Risk with respect to third party hosted applications, eMessaging and social media related risks. We continue to leverage and mature advancements in cyber defense capabilities to support our business model, protect our systems and enhance the experience of our clients on a global basis by employing industry best practices and collaborating with peers and experts, to provide our customers with confidence in their financial transactions.
Anti-money laundering	▲	We are subject to a dynamic set of anti-money laundering/anti-terrorist financing, economic sanctions and anti-bribery/anti-corruption (AML) laws and regulations across the multiple jurisdictions in which we operate. As the scope of criminal activities such as tax evasion, human trafficking, bribery and corruption continues to expand, regulators worldwide are intensifying regulatory requirements and increasing enforcement actions and penalties for those who fail to comply. We are committed to the management of AML risk and have implemented advanced and evolving AML policies, processes and controls to mitigate the risk of money laundering activities and meet our regulatory obligations to deter, detect and report such activities.
Exposure to more volatile sectors	▶	We manage risks associated with our wholesale loan portfolio by focusing on diversification, driven by limits on single name, country and industry exposures across all businesses, portfolios and transactions. We continue to adhere to strict lending standards and stress test our portfolio to assist in evaluating the potential impact of severe economic conditions.

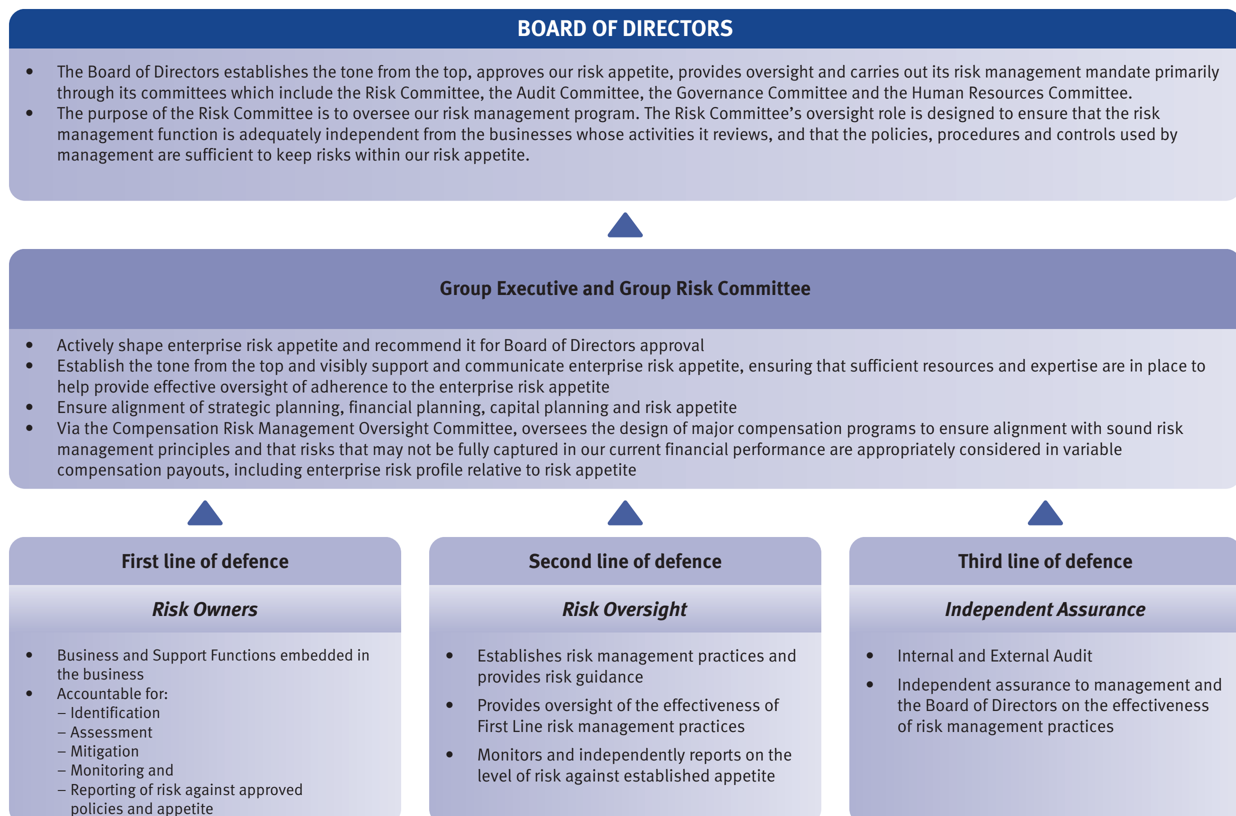
Emerging Risks	Trend	Commentary
▶ Risk did not increase in 2016	▲ Risk heightened during 2016	▲ New Emerging Risk in 2016
Technological innovation and new entrants	▶	The financial system continues to be subject to rapid technological change resulting in changing consumer habits and additional regulatory expectations and oversight responsibilities. New Fintech entrants have the potential to disrupt existing financial services value chains. These companies offer new payment methods and alternative lending solutions. In response, we have made digital and IT innovation a key strategic priority.
Increasing complexity of regulation	▶	We operate in multiple jurisdictions, and the continued expansion of the breadth and depth of regulations may lead to declining profitability and slower response to market needs. Financial reforms coming on stream in multiple jurisdictions may have significant impact on our businesses and could affect their strategies.
Data management	▲	Financial institutions are subject to increased informational demands from regulators and other stakeholders. We are continually investing in building better data management capabilities, including data ownership and stewardship, data architecture, metadata management, and data delivery, in order to enable consistent data aggregation, reporting and management.
Litigation and administrative penalties	▶	Some financial institutions have been affected by inadequate internal controls on risky or unlawful behaviour, including not conducting adequate due diligence on new clients, new products, misrepresentation, and not addressing customer privacy amid rapid increases in the scope and volume of personal data, leading to increased scrutiny from regulators.

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" risks we are able and willing to take, our risk conduct and culture articulates "how" we expect to take those risks.

Risk governance

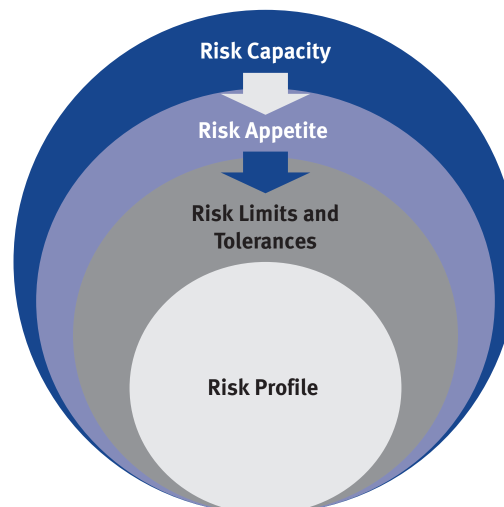
The risk governance model is well-established. The Board of Directors oversees the implementation of our risk management framework, while employees at all levels of the organization are responsible for managing the day-to-day risks that arise in the context of their mandate. As shown below, we use three lines of defence governance model to manage risks across the enterprise.



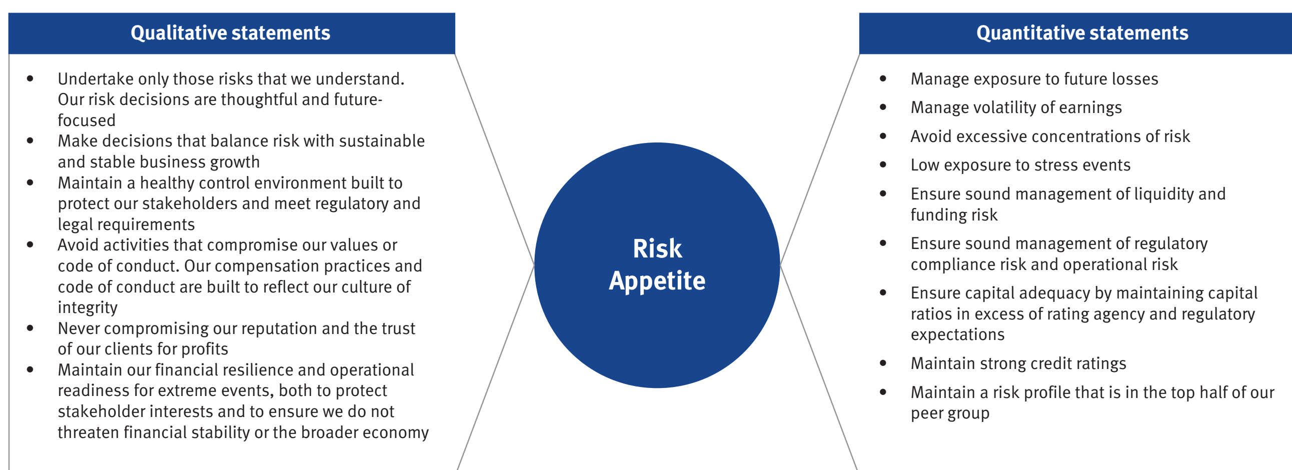
Risk Appetite
Our risk appetite is the amount and type of risk that we are able and willing to accept in the pursuit of its business objectives. The goal in managing risk is to protect us from an unacceptable loss or an undesirable outcome with respect to earnings volatility, capital adequacy or liquidity, while supporting and enabling our overall business strategy.

Our approach to articulating our risk appetite is focused around three key concepts:
1) The amount of "earnings at risk" that is determined to be acceptable over an economic cycle and including periods of moderate stress, using an expected future loss lens and considering potential revenue and expense contributions to earnings volatility;
2) The amount of "capital at risk" that is determined to be acceptable under severe and very severe stress, using an unexpected future loss lens; and
3) Ensuring adequate liquidity in times of stress.

Our Enterprise Risk Appetite Framework has several major components as follows:
- Define our risk capacity by identifying regulatory constraints that restrict our ability to accept risk.
- Establish and regularly confirm our risk appetite, comprised of strategic drivers and self-imposed constraints that define both the minimum and maximum amount of risk we are willing to accept given our financial strength, corporate objectives and business strategies.
- Set risk limits and tolerances to ensure that risk-taking activities are within our risk appetite.
- Assess our risk posture to confirm whether our strategic priorities entail taking on more risk over a one-year time frame, using a scale of contracting, stable or expanding.
- Regularly measure and evaluate our risk profile, representing the risks we are exposed to, relative to our risk appetite, and ensure appropriate action is taken to prevent risk profile from surpassing risk appetite.



We are in the business of taking risk; 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.



The Enterprise Risk Appetite Framework is structured in such a way that it can be applied at the enterprise, business segment, business unit and legal entity levels. The risk appetite is integrated into our business strategies and capital plan. We also ensure that the business strategy aligns with the enterprise and business segment level risk appetite.

Risk Conduct and Culture
We define our risk conduct and culture as a shared set of behavioural norms that sustains our core values and enables us to proactively identify, understand and act upon our risks, thereby protecting our clients, safeguarding our shareholders' value, and supporting the integrity, soundness and resilience of financial markets.

Risk behaviour expectations are in place and articulated through:
- Our Values;
- Code of Conduct;
- Risk management principles;
- Risk appetite statements;
- Regulatory conduct rules, practices and policies;
- Performance management processes; and
- The Risk Conduct and Culture Framework.

We have adopted the Financial Stability Board's four fundamental practices as foundational to an effective risk conduct and culture in order to enable and reward the desired risk behaviours and outcomes, namely:

- Tone from the top;
- Accountability;
- Effective communication and challenge; and
- Incentives that reinforce desired risk management behaviours.

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 risk conduct and culture can be assessed, monitored, sustained and subject to ongoing enhancement.

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 risk conduct and culture practices align with our values and support our risk appetite statements:

Sustaining and strengthening our risk conduct and culture relies upon effective linkages between our risk appetite, our enterprise-wide risk management program, our Code of Conduct, values, and human resources policies and practices. Regular assessment and monitoring is in place to identify strengths and weaknesses and areas for remediation. Our objective is to continually assess the effectiveness of our risk conduct and culture and to identify issues that could be signs of cultural problems and which, if not addressed, could undermine our long-term success, and, potentially jeopardize our safety and soundness.

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. Our measurement models and techniques are continually subject to independent assessment for appropriateness and reliability. 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.

Quantifying expected loss

Expected loss is used to assess earnings at risk and is a representation of losses that are statistically expected to occur in the normal course of business in a given period of time. For credit risk, the key parameters used to measure our exposure to expected loss are probability of default, loss given default, and exposure at default. For market risk, a statistical technique known as Value-at-Risk (VaR) is used to measure losses under normal market conditions.

Quantifying unexpected loss

Unexpected loss is used to assess capital at risk and is a statistical estimate of the amount by which actual earnings depart from the expected, over a specified time horizon, measured at a specified level of confidence. We hold capital to withstand these unexpected losses, should they occur. For further details, refer to the Capital management section.

Stress testing

Stress testing examines potential impacts arising from exceptional but plausible adverse events, and 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, and our financial position;
- Enhancing our understanding of available mitigating actions in response to adverse events; and
- Assessing the adequacy of our target capital 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 Group Risk Committee (GRC), the Board of Directors 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 of Directors 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, Canadian recessions, and energy price 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, our 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 at both the consolidated and subsidiary levels.

Back-testing

We back-test many market and credit risk parameters, including probability of default, loss given default, and usage given default. Back-testing is performed on a quarterly basis by comparing the realized values to the parameter estimates that are currently used to ensure the parameters remain appropriate for regulatory and economic capital calculations.

Validation of measurement models

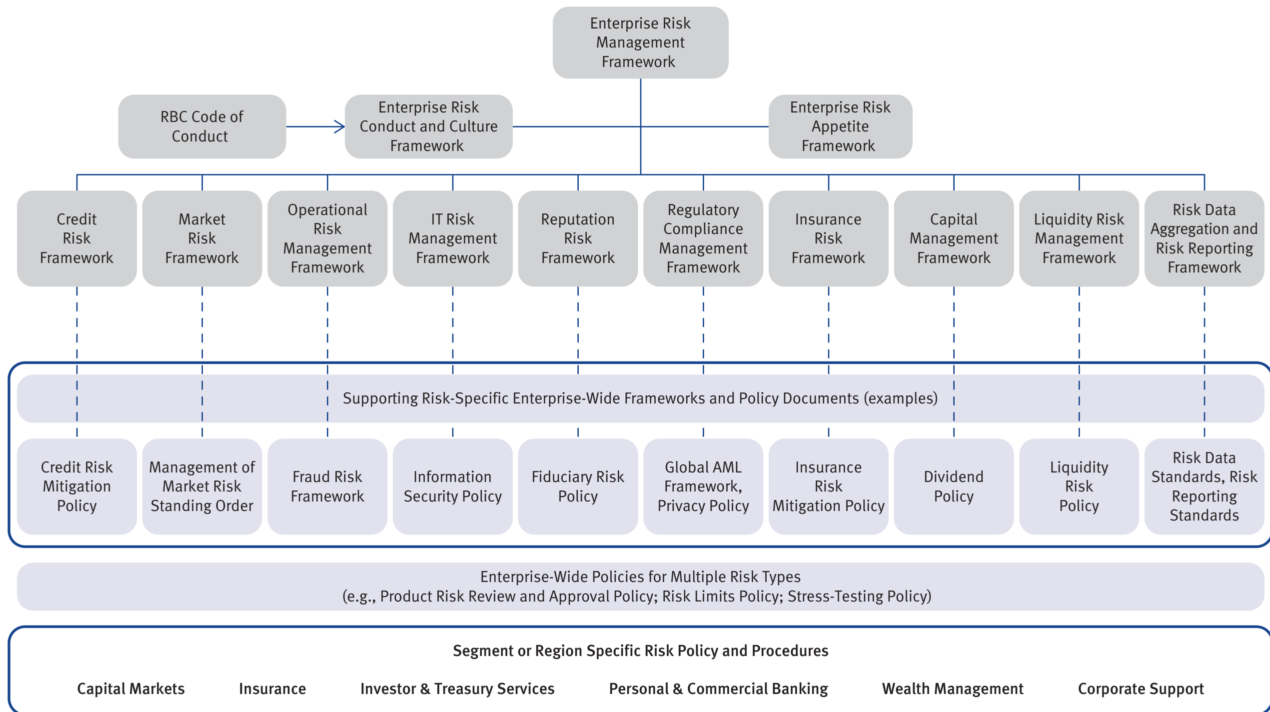
Models are widely used for many purposes at RBC, including the valuation of financial products and the measurement and management of different types of risk. Prior to their use, models are subject to an independent validation and approval by our model risk management function, a team of modelling professionals with reporting lines independent of those of the model developers and model 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 model risk 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. Our risk management frameworks and policies are organized into the following five levels:

- **Level 1: Enterprise Risk Management Framework** provides an overview of our enterprise-wide program for identifying, assessing, measuring, controlling, monitoring and reporting on the significant risks we face. This framework is underpinned by our Risk Appetite Framework and Risk Conduct and Culture Framework.
- **Level 2: Risk-Specific Frameworks** elaborate on each specific risk type and the mechanisms for identifying, measuring, monitoring and reporting of our principal risks; key policies; and roles and responsibilities.
- **Level 3: Enterprise Risk Policies** articulate minimum requirements, within which businesses and employees must operate.
- **Level 4: "Multi-risk" Enterprise Risk Policies** govern activities such as product risk review and approval, stress testing, risk limits, risk approval authorities and model risk management.
- **Level 5: Business Segments and Corporate Support – Specific Policies and Procedures** are established to manage the risks that are unique to their operations.

Risk controls are anchored by our Enterprise Risk Management and Risk-Specific Frameworks. These frameworks 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, structured credit, projects and initiatives, and new products and services.

Authorities and limits
The Risk Committee of the Board of Directors delegates credit, market and insurance risk authorities to the President & CEO and the Group Credit Risk Officer (GCRO). The delegated authorities allow these officers to approve single name, geographic (country and region) and industry sector exposures within defined parameters to manage concentration risk, establish underwriting and inventory limits for trading and investment banking activities and set market risk tolerances.

The Board of Directors also delegates liquidity risk authorities to the President & CEO, CAO & CFO, and GCRO. These limits act as a key risk control designed to ensure that reliable and cost-effective sources of cash or its equivalent are available to satisfy our current and prospective commitments.

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 of Directors 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 Board of Directors the Enterprise Risk Report which includes a comprehensive review of our risk profile relative to our risk appetite and focuses on the 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 a more 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 of Directors on top and emerging risks or changes in our risk profile.

Risk Pyramid
Our risk pyramid identifies and categorizes our principal risks 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:

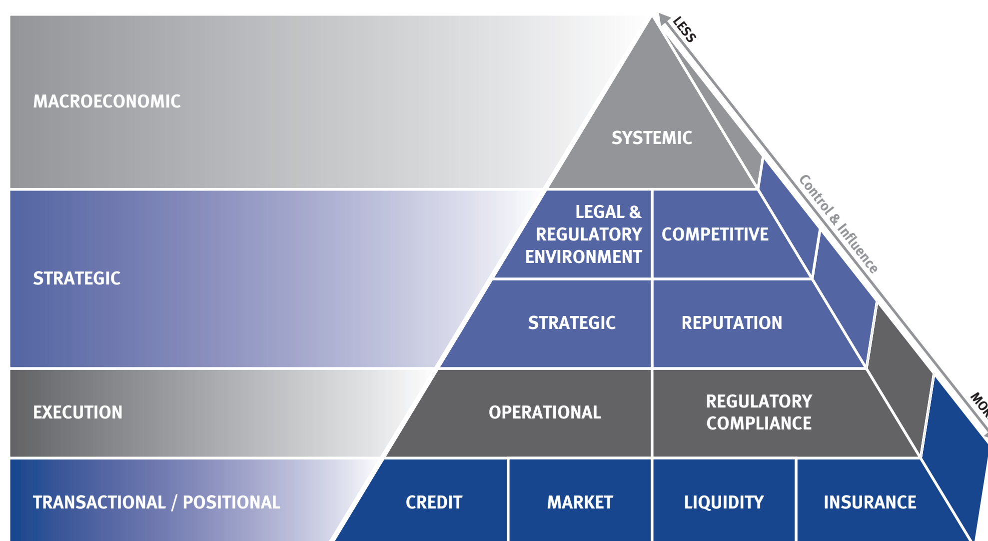
- *Risk Drivers* – Key factors that would have a strong influence on whether or not one or more of our risks will materialize, and
- *Control and Influence* – The risk types are organized vertically from the top of the pyramid to its base according to the relative degree of control and influence we are considered to have over each risk driver.

Risk Drivers

- 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 a rapid deterioration in the Canadian housing market, severe North American recession and a downturn in China. Resultant impacts can materialize as loss of revenue, as well as realization of credit, market or operational risk losses.
- Strategic: Business strategy is a major driver of our risk appetite and consequently 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 the regulatory framework. These choices also impact our revenue mix, affecting our exposure to earnings volatility and loss absorption capacity.
- 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.
- 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 transactions and balance sheet positions we undertake every day.

The base of the pyramid – 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 greater level of control and influence, are ranked higher on the pyramid than the other highly controllable risks. This ranking acknowledges the level of controllability associated with people, systems and external events.

The top of the pyramid – Systemic risk is placed at the top of our risk pyramid, and is generally considered the least controllable type of risk arising from the business environment impacting us. However, we have in place measures 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. 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.



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 2016 Annual Consolidated Financial Statements.

Credit risk

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

The failure to effectively manage credit risk across all our products, services and activities can have a direct, immediate and material impact on our earnings and reputation.

The responsibility for managing credit risk is shared broadly following the three lines of defence governance model. The Board of Directors, through its Risk Committee, delegates credit risk approval authorities to the CEO and GCRO. Credit transactions in excess of these authorities must be approved by the Risk Committee. To facilitate day-to-day business operations, the Group Chief Risk Officer has been empowered to further delegate credit risk approval authorities to individuals within Group Risk Management, the business segments, and Corporate Support as necessary.

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 RBC.

We balance our risk and return by:
- Ensuring credit quality is not compromised for growth;
- Mitigating credit risks 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.

Risk measurement – Credit risk

We quantify credit risk, at both the individual obligor and portfolio levels, to manage expected credit losses in order to limit earnings volatility and minimize unexpected losses.

We employ different risk measurement processes for our wholesale and retail credit portfolios. The wholesale portfolio comprises businesses, sovereigns, public sector entities, banks and other financial institutions, and certain individuals and small businesses that are managed on an individual client basis. The retail portfolio is comprised of residential mortgages, personal, credit card, and small business loans, which are managed on a pooled basis. Credit risk rating systems are designed to assess and quantify the risk inherent in credit activities in an accurate and consistent manner.

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

Economic capital, which is our internal quantification of risks, is used extensively 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.

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

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 is based 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, consistent with the external rating agencies. 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 45**

Ratings	BRR	S&P	Moody's	Description
1	1+	AAA	Aaa	Investment Grade
2	1H	AA+	Aa1	
3	1M	AA	Aa2	
4	1L	AA-	Aa3	
5	2+H	A+	A1	
6	2+M	A	A2	
7	2+L	A-	A3	
8	2H	BBB+	Baa1	
9	2M	BBB	Baa2	
10	2L	BBB-	Baa3	
11	2-H	BB+	Ba1	Non-investment Grade
12	2-M	BB	Ba2	
13	2-L	BB-	Ba3	
14	3+H	B+	B1	
15	3+M	B	B2	
16	3+L	B-	B3	
17	3H	CCC+	Caa1	
18	3M	CCC	Caa2	
19	3L	CCC-	Caa3	
20	4	CC	Ca	
21	5	C	C	Impaired
22	6	Bankruptcy	Bankruptcy	

* This table represents an integral part of our 2016 Annual Consolidated Financial Statements.

Each credit facility is assigned an LGD rate that is largely driven by factors that impact the extent of losses in the event the obligor defaults; including seniority of debt, collateral security, and the industry sector in which the obligor operates. Estimated LGD rates draw primarily on internal loss experience since the late 1990s. 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 and the type of obligor. 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.

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 the 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 derivatives (e.g., precious metal and commodities). For further details on our derivative instruments and credit risk mitigation, refer to Note 8 of our 2016 Annual Consolidated Financial Statements.

Wrong-way risk

Wrong-way risk is the risk that exposure to a counterparty or obligor 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 and highly correlated with the probability of default of the counterparty due to the nature of our transactions with them (e.g., loan collateralized by shares or debt issued by the counterparty or a related party); and
- 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 (the value of the collateral declines).

Retail credit risk

Credit scoring is the primary risk rating system for assessing obligor and transaction risk for retail exposures. Credit scores are one of the factors employed in the acquisition of new clients and management of existing clients.

Retail exposures are managed on a pooled basis, with each pool consisting of a group or segment of exposures that possess similar homogeneous characteristics. Criteria used to pool exposures for risk quantification include behavioural score, product type (mortgages, credit cards, lines of credit and instalment loans), collateral type (chattel, liquid assets and real estate), utilization rate, loan-to-value, and the delinquency status (performing, delinquent and default) of the exposure. Regular monitoring and periodic adjustments & alignments are conducted to ensure that this process provides for a meaningful differentiation of risk.

Credit risk parameters (PD and EAD) are estimated based on pools which consider borrower and transaction characteristics, including behavioural credit score, product type, utilization rate and delinquency status. LGD parameter estimates are based on transaction specific factors, including products, loan-to-value and collateral types. All parameters are determined based on over 10 years of historical economic losses with a high degree of granularity and additional margins of conservatism. Parameters are back-tested regularly by the retail Basel team and validated by an independent team within Group Risk Management.

The following table maps PD bands to various risk levels:

Internal ratings map* **Table 46**

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 2016 Annual Consolidated Financial Statements.

Risk control – Credit risk

The Board of Directors 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 of Directors, 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.

Credit policies are an integral component of our Credit Risk Framework and set out the minimum requirements for the management of credit risk as follows:

Credit risk assessment

- Mandatory use of credit risk rating and scoring systems.
- Consistent credit risk assessment criteria.
- Standard content requirements in credit application documents.

Credit risk mitigation

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, the majority of our securities finance and over-the-counter (OTC) derivatives activities are secured by cash and liquid government securities such as Organisation for Economic Co-operation and Development (OECD) securities. Wholesale lending is often secured by pledges of the assets of a business, such as accounts receivable, inventory, operating assets and commercial real estate. In our Canadian Banking business and Wealth Management segment, 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 are compliant with regulatory requirements that govern residential mortgage underwriting practices, including loan-to-value parameters and property valuation requirements. For further information regarding residential mortgages, refer to table 55.

Credit derivatives

- We use credit derivatives as a tool to mitigate industry sector concentration and single-name exposure. For a more detailed description of the types of credit derivatives we enter into and how we manage related credit risk, refer to Note 8 of our 2016 Annual Consolidated Financial Statements.

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, the bank's policy and the customer's willingness and capacity to meet the new arrangement. During 2016, some concessions were made to clients affected by low oil prices, the associated slowdown in Alberta's economy and the wildfires in Fort McMurray; however, the overall impact of these concessions on our financial results was minimal.

Product approval

- Proposals for credit products and services are comprehensively reviewed and approved under a risk assessment framework. New, amended and existing products must be reviewed relative to all risks in our risk pyramid, including credit risk. All products must be reviewed on a periodic basis, with high risk products being reviewed more frequently.

Credit portfolio management

- 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 limits are established at the following levels: single name limits (notional and economic capital), underwriting risk limits, leveraged lending limits, geographic (country and region) limits (notional and economic capital), industry sector limits (notional and economic capital), and product and portfolio limits, where deemed necessary.

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 lending-related and other, and 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, available-for-sale (AFS) debt securities 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 into account collateral.
- Derivative amount which represents the credit equivalent amount, which is defined by OSFI as the replacement cost plus an add-on amount for potential future credit exposure.

Gross credit risk exposure by portfolio and sector*												Table 47
	As at											
	October 31 2016						October 31 2015					
	Lending-related and other			Trading-related			Lending-related and other			Trading-related		
	Loans and acceptances						Loans and acceptances					
(Millions of Canadian dollars)	Outstanding	Undrawn commitments (1)	Other (2)	Repo-style transactions	Derivatives (3)	Total exposure (4)	Outstanding	Undrawn commitments (1)	Other (2)	Repo-style transactions	Derivatives (3)	Total exposure (4)
Residential mortgages	$ 254,998	$ 1,063	$ 214	$ –	$ –	$ 256,275	$ 233,975	$ –	$ 206	$ –	$ –	$ 234,181
Personal	93,466	82,527	145	–	–	176,138	94,346	78,885	154	–	–	173,385
Credit cards	17,128	24,571	–	–	–	41,699	15,859	24,827	–	–	–	40,686
Small business (5)	3,878	6,188	5	–	–	10,071	4,003	5,370	9	–	–	9,382
Retail	$ 369,470	$ 114,349	$ 364	$ –	$ –	$ 484,183	$ 348,183	$ 109,082	$ 369	$ –	$ –	$ 457,634
Business (5)												
Agriculture	$ 6,515	$ 1,310	$ 74	$ –	$ 109	$ 8,008	$ 6,057	$ 1,279	$ 80	$ –	$ 86	$ 7,502
Automotive	7,279	5,785	567	–	497	14,128	6,614	5,104	407	–	984	13,109
Consumer goods	10,052	9,562	756	–	551	20,921	7,146	7,093	594	–	470	15,303
Energy												
Oil & Gas	6,259	10,747	1,656	–	1,198	19,860	7,691	13,274	1,330	–	839	23,134
Utilities	7,680	13,694	3,496	–	1,748	26,618	5,162	13,389	3,149	60	1,482	23,242
Forest products	1,099	561	85	–	27	1,772	1,169	535	108	–	40	1,852
Industrial products	5,508	7,757	546	–	632	14,443	4,725	5,418	513	–	538	11,194
Mining & metals	1,455	3,640	1,135	–	144	6,374	1,402	3,883	906	–	255	6,446
Non-bank financial services	8,408	13,149	15,830	249,732	41,381	328,500	6,428	13,060	18,002	201,845	29,769	269,104
Real estate & related	40,419	11,215	1,847	4	499	53,984	33,802	9,210	1,910	63	373	45,358
Technology & media	11,019	14,758	873	470	1,832	28,952	6,599	14,182	574	6	1,703	23,064
Transportation & environment	6,060	4,393	3,603	–	1,637	15,693	5,907	4,300	2,960	–	1,474	14,641
Other sectors	42,948	19,607	18,647	2,786	3,391	87,379	35,133	17,166	15,620	4,915	15,386	88,220
Sovereign (5)	10,581	6,972	84,017	38,707	17,319	157,596	9,887	5,614	57,413	30,871	10,162	113,947
Bank (5)	1,930	1,815	119,324	104,314	25,600	252,983	1,800	1,015	86,106	102,371	27,221	218,513
Wholesale	$ 167,212	$ 124,965	$252,456	$ 396,013	$ 96,565	$ 1,037,211	$ 139,522	$ 114,522	$189,672	$ 340,131	$ 90,782	$ 874,629
Total exposure	$ 536,682	$ 239,314	$252,820	$ 396,013	$ 96,565	$ 1,521,394	$ 487,705	$ 223,604	$190,041	$ 340,131	$ 90,782	$ 1,332,263

* This table represents an integral part of our 2016 audited Annual Consolidated Financial Statements.

(1) Undrawn commitments represent an estimate of the contractual amount that may be drawn upon at the time of default of an obligor.

(2) Includes credit equivalent amounts for contingent liabilities such as letters of credit and guarantees, outstanding amounts for AFS debt securities, deposits with financial institutions and other assets.

(3) Credit equivalent amount after factoring in master netting agreements.

(4) 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 HELOC are included in Personal.

(5) Refer to Note 5 of our audited 2016 Annual Consolidated Financial Statements for the definitions of these terms.

2016 vs. 2015

Total gross credit risk exposure increased $189 billion or 14% from last year, primarily due to the inclusion of City National, an increase in repo-style transactions and Other exposure related to AFS debt securities, higher deposits balances and volume growth in residential mortgages. The increase in wholesale loans mainly reflected increased client activity, as well as the impact from foreign exchange translation.

Retail exposure increased $27 billion or 6%, mainly due to the inclusion of City National and continued volume growth in residential mortgages and credit cards.

Wholesale exposure increased $163 billion or 19%, primarily attributable to the inclusion of City National, an increase in repo-style transactions, higher Other exposure related to corporate and government AFS debt securities and higher deposits with the Federal Reserve reflecting our management of liquidity and funding risk. Volume growth in wholesale loans across various industry sectors, higher fair values on foreign exchange contracts and interest rate swaps, and the impact from foreign exchange translation also contributed to the increase. Wholesale loan utilization was 40%, up from 37% last year.

As at October 31, 2016, our loans and acceptances exposure to oil and gas was $17 billion (October 31, 2015 – $21 billion); which is comprised of outstanding loans of $6 billion (October 31, 2015 – $8 billion), and undrawn commitments of $11 billion (October 31, 2015 – $13 billion). The oil and gas portfolio represents 2.19% (October 31, 2015 – 2.95%) of our total loan and acceptances portfolio. Of the $17 billion exposure, 42% was to investment grade while 58% was to non-investment grade counterparties (October 31, 2015 – 46% and 54%, respectively).

Our AFS Securities (banking book) exposures are rated 95% investment grade and 5% non-investment grade.

Gross credit risk exposure by geography* (1) — Table 48

	As at											
	October 31 2016						October 31 2015					
	Lending-related and other			Trading-related			Lending-related and other			Trading-related		
	Loans and acceptances						Loans and acceptances					
(Millions of Canadian dollars)	Outstanding	Undrawn commitments	Other	Repo-style transactions	Derivatives	Total exposure	Outstanding	Undrawn commitments	Other	Repo-style transactions	Derivatives	Total exposure
Canada	$ 430,616	$ 151,481	$ 81,800	$ 76,094	$ 27,647	$ 767,638	$ 414,427	$ 144,352	$ 70,774	$ 64,855	$ 27,272	$ 721,680
U.S.	76,481	69,006	81,168	208,759	14,315	449,729	40,186	60,031	50,915	179,021	14,023	344,176
Europe	14,886	15,367	74,547	71,722	48,318	224,840	17,706	15,574	52,294	58,900	44,480	188,954
Other International	14,699	3,460	15,305	39,438	6,285	79,187	15,386	3,647	16,058	37,355	5,007	77,453
Total Exposure	$ 536,682	$ 239,314	$ 252,820	$ 396,013	$ 96,565	$ 1,521,394	$ 487,705	$ 223,604	$ 190,041	$ 340,131	$ 90,782	$ 1,332,263

* This table represents an integral part of our 2016 audited Annual Consolidated Financial Statements.
(1) Geographic profile is based on country of residence of the borrower.

2016 vs. 2015

Canada exposure increased $46 billion or 6% compared to the prior year, primarily due to higher loans and acceptances and growth in repo-style transactions.

U.S. exposure increased $106 billion or 31% compared to the prior year, mainly due to the inclusion of City National, growth in repo-style transactions, higher Other exposure related to AFS debt securities, higher deposits with the Federal Reserve, and the impact from foreign exchange translation.

Europe exposure increased $36 billion or 19% compared to the prior year, mainly due to an increase in repo-style transactions, higher Other exposure related to AFS debt securities, and increased deposits with central banks.

Other International exposure increased $2 billion or 2% compared to the prior year.

Loans and acceptances outstanding and undrawn commitments* (1), (2) — Table 49

	As at									
	October 31 2016					October 31 2015				
(Millions of Canadian dollars)	Low risk	Medium risk	High risk	Impaired	Total	Low risk	Medium risk	High risk	Impaired	Total
Retail (3)										
Residential mortgages	$ 231,399	$ 12,750	$ 2,090	$ 667	$ 246,906	$ 218,151	$ 13,080	$ 2,098	$ 646	$ 233,975
Personal	159,841	10,624	2,768	300	173,533	157,996	12,020	2,916	299	173,231
Credit cards	34,758	5,342	1,437	–	41,537	34,547	4,772	1,367	–	40,686
Small business	7,148	1,201	1,671	46	10,066	6,878	1,047	1,403	45	9,373
	$ 433,146	$ 29,917	$ 7,966	$ 1,013	$ 472,042	$ 417,572	$ 30,919	$ 7,784	$ 990	$ 457,265

	As at							
	October 31 2016				October 31 2015			
(Millions of Canadian dollars)	Investment grade	Non-investment grade	Impaired	Total	Investment grade	Non-investment grade	Impaired	Total
Wholesale (4)								
Business	$ 107,510	$ 132,967	$ 2,339	$ 242,816	$ 105,871	$ 128,564	$ 1,293	$ 235,728
Sovereign	15,939	786	–	16,725	14,704	797	–	15,501
Bank	1,881	943	2	2,826	2,475	338	2	2,815
Total	$ 125,330	$ 134,696	$ 2,341	$ 262,367	$ 123,050	$ 129,699	$ 1,295	$ 254,044

* This table represents an integral part of our audited 2016 Annual Consolidated Financial Statements.
(1) This table represents our retail and wholesale loans and acceptances outstanding and undrawn commitments by portfolio and risk category, excluding City National exposures of $41.6 billion.
(2) The amounts in the table are before allowance for impaired loans.
(3) Includes undrawn commitments of $1.0 billion, $82.4 billion, $24.6 billion, and $6.2 billion for Residential mortgages, Personal, Credit cards and Small business, respectively (October 31, 2015 – $nil, $78.9 billion, $24.8 billion and $5.4 billion, respectively).
(4) Includes undrawn commitments of $111.3 billion, $7.0 billion, and $1.2 billion for Business, Sovereign and Bank, respectively (October 31, 2015 – $107.9 billion, $5.6 billion, and $1.0 billion, respectively).

2016 vs. 2015

Growth in retail exposures was largely attributable to continued volume growth in residential mortgages and credit cards. Growth in wholesale exposures mainly reflects increased volumes across various industry sectors in investment grade and non-investment grade categories, as well as the impact from foreign exchange translation.

Net European exposure by country (1), (2) — Table 50

(Millions of Canadian dollars)	October 31 2016 Loans outstanding	Securities (3)	Repo-style transactions	Derivatives	Total	October 31 2015 Total
U.K.	$ 8,027	$ 5,409	$ 1,102	$ 3,418	$ 17,956	$ 20,964
Germany	783	10,014	1	475	11,273	9,496
France	1,066	6,878	1	453	8,398	4,533
Total U.K., Germany, France	$ 9,876	$ 22,301	$ 1,104	$ 4,346	$ 37,627	$ 34,993
Greece	$ –	$ –	$ –	$ –	$ –	$ –
Ireland	684	32	80	84	880	1,319
Italy	54	58	–	8	120	100
Portugal	6	–	–	10	16	9
Spain	339	51	–	56	446	439
Total Peripheral (4)	$ 1,083	$ 141	$ 80	$ 158	$ 1,462	$ 1,867
Luxembourg	$ 898	$ 428	$ 5	$ 53	$ 1,384	$ 4,890
Netherlands	1,067	6,757	7	743	8,574	4,983
Norway	227	3,709	–	9	3,945	4,886
Sweden	258	3,888	1	21	4,168	3,376
Switzerland	1,178	766	97	230	2,271	1,753
Other	1,447	1,399	32	104	2,982	3,345
Total Other Europe	$ 5,075	$ 16,947	$ 142	$ 1,160	$ 23,324	$ 23,233
Net exposure to Europe (5), (6)	$ 16,034	$ 39,389	$ 1,326	$ 5,664	$ 62,413	$ 60,093

(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 $64.0 billion against repo-style transactions (October 31, 2015 – $58 billion) and $15.7 billion against derivatives (October 31, 2015 – $10.7 billion).
(3) Securities include $11.1 billion of trading securities (October 31, 2015 – $12.8 billion), $12.3 billion of deposits (October 31, 2015 – $11.5 billion), and $15.9 billion of AFS securities (October 31, 2015 – $13.0 billion).
(4) Gross credit risk exposure to peripheral Europe is comprised of Greece $nil (October 31, 2015 – $nil), Ireland $18.9 billion (October 31, 2015 – $11.7 billion), Italy $0.3 billion (October 31, 2015 – $0.3 billion), Portugal $0.1 billion (October 31, 2015 – $nil), and Spain $1.1 billion (October 31, 2015 – $1.2 billion).
(5) Excludes $1.9 billion (October 31, 2015 – $2.6 billion) of exposures to supranational agencies.
(6) Reflects $1.5 billion of mitigation through credit default swaps, which are largely used to hedge single name exposures and market risk (October 31, 2015 – $1.8 billion).

2016 vs. 2015

Net credit risk exposure to Europe increased $2.3 billion from last year, largely driven by increased exposure to France, the Netherlands and Germany, partially offset by a decrease in exposure to Luxembourg, the U.K. and Norway. Our net exposure to peripheral Europe, which includes Greece, Ireland, Italy, Portugal and Spain, remained minimal, with total outstanding exposure decreasing $0.4 billion during the year to $1.5 billion.

Our European corporate loan book is managed on a global basis and the underwriting standards for this loan book reflect the same approach to the use of our balance sheet as we have applied in both Canada and the U.S. PCL taken during the year on this portfolio was not material. The gross impaired loans ratio of this loan book was 1.1%, up from 0.6% last year.

Net European exposure by client type — Table 51

(Millions of Canadian dollars)	October 31 2016 U.K.	Germany	France	Total U.K., Germany, France	Greece	Ireland	Italy	Portugal	Spain	Total Peripheral	Other Europe	Total Europe	October 31 2015 Total Europe
Financials	$ 8,372	$ 8,507	$ 1,176	$ 18,055	$ –	$ 158	$ 64	$ 10	$ 27	$ 259	$ 11,347	$ 29,661	$ 27,835
Sovereign	1,746	1,671	6,762	10,179	–	12	12	–	–	24	7,139	17,342	14,815
Corporate	7,838	1,095	460	9,393	–	710	44	6	419	1,179	4,838	15,410	17,443
Total	$ 17,956	$ 11,273	$ 8,398	$ 37,627	$ –	$ 880	$ 120	$ 16	$ 446	$ 1,462	$ 23,324	$ 62,413	$ 60,093

2016 vs. 2015

Our net exposure to Sovereign increased $2.5 billion, mainly due to increases in France, Germany and Other Europe, partly offset by decreases in the U.K. The net exposure to Financials increased $1.8 billion, mostly in Germany and the U.K., partly offset by decreases in Other Europe. The net exposure to Corporate decreased $2.0 billion, mainly in the U.K. and Germany.

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 52**

	As at October 31, 2016					
	Residential mortgages (1)					Home equity lines of credit (2)
(Millions of Canadian dollars, except percentage amounts)	Insured (3)		Uninsured		Total	Total
Region (4)						
Canada						
Atlantic provinces	$ 7,633	59%	$ 5,409	41%	$ 13,042	$ 2,034
Quebec	14,432	50	14,429	50	28,861	4,060
Ontario	43,314	43	58,016	57	101,330	16,512
Alberta	21,746	58	15,429	42	37,175	7,066
Saskatchewan and Manitoba	8,897	54	7,730	46	16,627	2,682
B.C. and territories	17,657	40	27,024	60	44,681	8,739
Total Canada (5)	$ 113,679	47%	$ 128,037	53%	$ 241,716	$ 41,093
U.S.	2	–	10,012	100	10,014	1,464
Other International	13	–	3,171	100	3,184	2,442
Total International	$ 15	–	$ 13,183	100%	$ 13,198	$ 3,906
Total	$ 113,694	45%	$ 141,220	55%	$ 254,914	$ 44,999

	As at October 31, 2015					
	Residential mortgages (1)					Home equity lines of credit (2)
(Millions of Canadian dollars, except percentage amounts)	Insured (3)		Uninsured		Total	Total
Region (4)						
Canada						
Atlantic provinces	$ 6,856	55%	$ 5,586	45%	$ 12,442	$ 2,060
Quebec	12,414	46	14,621	54	27,035	4,157
Ontario	36,555	39	58,036	61	94,591	16,785
Alberta	19,872	55	16,423	45	36,295	7,189
Saskatchewan and Manitoba	7,690	48	8,174	52	15,864	2,751
B.C. and territories	15,755	36	27,555	64	43,310	9,085
Total Canada (5)	$ 99,142	43%	$ 130,395	57%	$ 229,537	$ 42,027
U.S.	–	–	772	100	772	334
Other International	14	–	3,202	100	3,216	3,107
Total International	$ 14	–	$ 3,974	100%	$ 3,988	$ 3,441
Total	$ 99,156	42%	$ 134,369	58%	$ 233,525	$ 45,468

(1) The residential mortgages amounts exclude our third-party mortgage-backed securities (MBS) of $84 million (2015 – $450 million).
(2) HELOC includes revolving and non-revolving loans.
(3) 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.
(4) Region is based upon address of the property mortgaged. The Atlantic provinces are comprised of Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick, and B.C. and territories are comprised of British Columbia, Nunavut, Northwest Territories and Yukon.
(5) Total consolidated residential mortgages in Canada of $242 billion (2015 – $230 billion) is largely comprised of $217 billion (2015 – $205 billion) of residential mortgages and $6 billion (2015 – $5 billion) of mortgages with commercial clients, of which $3 billion (2015 – $3 billion) are insured mortgages, both in Canadian Banking, and $19 billion (2015 – $19 billion) of residential mortgages in Capital Markets held for securitization purposes.

Home equity lines of credit are uninsured and reported within the personal loan category. As at October 31, 2016, home equity lines of credit in Canadian Banking were $41 billion (2015 – $42 billion). Approximately 98% of these home equity lines of credit (2015 – 98%) are secured by a first lien on real estate, and 7% of the total homeline clients (2015 – 8%) 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 53**

	As at					
	October 31 2016			October 31 2015		
	Canada	**U.S. and Other International**	**Total**	Canada	U.S. and Other International	Total
Amortization period						
≤ 25 years	**74%**	**40%**	**72%**	75%	77%	75%
> 25 years ≤ 30 years	**25**	**58**	**27**	23	23	23
> 30 years ≤ 35 years	**1**	**2**	**1**	2	–	2
> 35 years	**–**	**–**	**–**	–	–	–
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 54**

	October 31 2016		October 31 2015	
	Uninsured		Uninsured	
	Residential mortgages (1)	**Homeline products (2)**	Residential mortgages (1)	Homeline products (2)
Region (3)				
Atlantic provinces	**73%**	**74%**	74%	75%
Quebec	**71**	**74**	71	73
Ontario	**70**	**69**	70	70
Alberta	**73**	**72**	73	73
Saskatchewan and Manitoba	**74**	**74**	74	75
B.C. and territories	**68**	**65**	69	66
U.S.	**72**	**n.m.**	72	n.m.
Other International	**63**	**n.m.**	61	n.m.
Average of newly originated and acquired for the year (4), (5)	**71%**	**69%**	71%	70%
Total Canadian Banking residential mortgages portfolio (6)	**54%**	**51%**	55%	54%

(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

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.

Credit quality performance

Provision for (recovery of) credit loss		Table 55
(Millions of Canadian dollars, except percentage amounts)	2016	2015
Personal & Commercial Banking	$ 1,122	$ 984
Wealth Management	48	46
Capital Markets	327	71
Corporate Support and Other (1)	49	(4)
Total PCL	**$ 1,546**	**$ 1,097**
Canada (2)		
Residential mortgages	$ 42	$ 27
Personal	459	393
Credit cards	435	371
Small business	34	32
Retail	970	823
Wholesale	213	116
PCL on impaired loans	1,183	939
U.S. (2), (3)		
Retail	$ 1	$ 1
Wholesale	227	40
PCL on impaired loans	228	41
Other International (2), (3)		
Retail	$ 41	$ 21
Wholesale	44	96
PCL on impaired loans	85	117
PCL on loans not yet identified as impaired	50	–
Total PCL	**$ 1,546**	**$ 1,097**
PCL ratio		
Total PCL ratio	0.29%	0.24%
PCL on impaired loans ratio	0.28%	0.24%
Personal & Commercial Banking	0.29%	0.27%
Canadian Banking	0.29%	0.25%
Caribbean Banking	0.53%	0.85%
Wealth Management	0.10%	0.26%
PCL ratio – loans	0.08%	0.26%
PCL ratio – acquired credit-impaired loans	0.02%	n.a.
Capital Markets	0.37%	0.09%

(1) PCL in Corporate Support and Other primarily comprised of PCL for loans not yet identified as impaired. For further information, refer to the How we measure and report our business segments section.
(2) Geographic information is based on residence of borrower.
(3) Includes acquired credit-impaired loans.
n.a. not applicable

2016 vs. 2015
Total PCL increased $449 million, or 41% from the prior year. The PCL ratio of 29 bps increased 5 bps.

PCL in Personal & Commercial Banking increased $138 million or 14%, and the PCL ratio of 29 bps increased 2 bps, largely due to higher provisions in our Canadian personal and commercial lending portfolios and higher write-offs in our Canadian credit cards portfolio. These factors were partially offset by lower PCL in our Caribbean portfolios.

PCL in Wealth Management increased $2 million mainly reflecting provisions recorded in City National. PCL in the prior year largely reflected provisions related to the International Wealth Management business.

PCL in Capital Markets increased $256 million, primarily due to higher provisions in the oil & gas sector.

PCL in Corporate Support and Other increased $52 million, reflecting a $50 million increase in PCL for loans not yet identified as impaired.

Gross impaired loans (GIL)		Table 56
(Millions of Canadian dollars, except percentage amounts)	2016	2015
Personal & Commercial Banking	$ 1,651	$ 1,809
Wealth Management (1)	710	178
Capital Markets	1,524	296
Investor & Treasury Services	2	2
Corporate Support and Other	16	–
Total GIL	**$ 3,903**	**$ 2,285**
Canada (2)		
Retail	$ 642	$ 624
Wholesale	522	512
GIL	1,164	1,136
U.S. (1), (2)		
Retail	$ 56	$ 10
Wholesale	1,736	204
GIL	1,792	214
Other International (2)		
Retail	$ 380	$ 356
Wholesale	567	579
GIL	947	935
Total GIL	**$ 3,903**	**$ 2,285**
Impaired loans, beginning balance	$ 2,285	$ 1,977
Classified as impaired during the period (new impaired) (3)	3,673	1,709
Net repayments (3)	(946)	(158)
Amounts written off	(1,523)	(1,338)
Other (3), (4)	414	95
Impaired loans, balance at end of period	$ 3,903	$ 2,285
GIL ratio (5)		
Total GIL ratio	0.73%	0.47%
Personal & Commercial Banking	0.43%	0.49%
Canadian Banking	0.27%	0.30%
Caribbean Banking	7.56%	9.13%
Wealth Management	1.44%	1.01%
GIL ratio – loans	0.59%	1.01%
GIL ratio – acquired credit-impaired loans	0.85%	n.a.
Capital Markets	1.73%	0.37%

(1) Includes $418 million (2015 – $nil) related to acquired credit impaired loans, with over 80% covered by loss-sharing agreements with the Federal Deposit Insurance Corporation (FDIC). For further details refer to Notes 2 and 5 of our 2016 Annual Consolidated Financial Statements.
(2) Geographic information is based on residence of borrower.
(3) 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.
(4) Includes Return to performing status during the year, Recoveries of loans and advances previously written off, Sold, and Exchange and other movements.
(5) GIL as a % of loans and acceptances.
n.a. not applicable

2016 vs. 2015

Total GIL increased $1,618 million or 71%, and the GIL ratio of 73 bps increased 26 bps, from a year ago.

GIL in Personal & Commercial Banking decreased $158 million or 9%, and the GIL ratio of 43 bps decreased 6 bps, mainly due to lower impaired loans in our commercial lending portfolios.

GIL in Wealth Management increased $532 million, mainly due to the inclusion of our acquisition of City National, largely reflecting acquired credit impaired loans (ACI) of $418 million. Over 80% of these loans are covered by loss-sharing agreements with the Federal Deposit Insurance Corporation (FDIC). For further details on ACI loans, refer to Notes 2 and 5 of our 2016 Annual Consolidated Financial Statements.

GIL in Capital Markets increased $1,228 million, primarily due to higher impaired loans in the oil & gas sector reflecting the lower oil price environment.

Allowance for credit losses (ACL)		Table 57
(Millions of Canadian dollars)	2016	2015
Allowance for impaired loans		
Personal & Commercial Banking	$ 520	$ 548
Wealth Management (1)	73	43
Capital Markets	216	61
Investor & Treasury Services	–	2
Total allowance for impaired loans	**$ 809**	$ 654
Canada (2)		
Retail	$ 160	$ 142
Wholesale	119	111
Allowance for impaired loans	279	253
U.S. (1), (2)		
Retail	$ 2	$ 1
Wholesale	177	47
Allowance for impaired loans	179	48
Other International (2)		
Retail	$ 180	$ 169
Wholesale	171	184
Allowance for impaired loans	351	353
Total allowance for impaired loans	**$ 809**	$ 654
Allowance for loans not yet identified as impaired	1,517	1,466
Total ACL	**$ 2,326**	$ 2,120

(1) Effective Q1 2016, includes ACL related to acquired credit-impaired loans from our acquisition of City National.
(2) Geographic information is based on residence of borrower.

2016 vs. 2015
Total ACL increased $206 million or 10% from a year ago, mainly related to higher ACL in Capital Markets, reflecting the low oil price environment, and higher ACL in Wealth Management, largely due to the inclusion of our acquisition of City National. This was partially offset by lower ACL in Personal & Commercial Banking. In addition, we recorded a $50 million increase in the allowance for loans not yet identified as impaired recorded in the second quarter of 2016.

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 at fair value through profit and loss (FVTPL), including impaired securities, and
   b) Hedge ineffectiveness.
2. CET1 capital, which includes:
   a) All of the above, plus
   b) Changes in the fair value of AFS securities where revaluation gains and losses are reported as other comprehensive income,
   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, including 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 risk-weighted assets (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 Enterprise Risk Appetite Framework, the Board of Directors approves our overall market risk constraints. GRM creates and manages the control structure for FVTPL positions that 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. Stressed VaR 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 over the last 30 years 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 2016 and 2015.

Market Risk VaR* **Table 58**

	2016				2015			
	As at	For the year ended October 31			As at	For the year ended October 31		
(Millions of Canadian dollars)	Oct. 31	Average	High	Low	Oct. 31	Average	High	Low
Equity	$ 13	$ 16	$ 32	$ 7	$ 20	$ 12	$ 31	$ 6
Foreign exchange	5	5	8	3	4	4	8	3
Commodities	5	3	5	2	3	3	6	2
Interest rate	18	21	32	14	26	28	34	23
Credit specific (1)	4	5	7	4	6	8	9	6
Diversification (2)	(21)	(17)	(23)	(11)	(18)	(22)	(34)	(15)
Market risk VaR	$ 24	$ 33	$ 53	$ 20	$ 41	$ 33	$ 45	$ 26
Market risk SVaR	$ 46	$ 82	$ 150	$ 41	$ 109	$ 104	$ 157	$ 73

* This table represents an integral part of our 2016 Annual Consolidated Financial Statements.

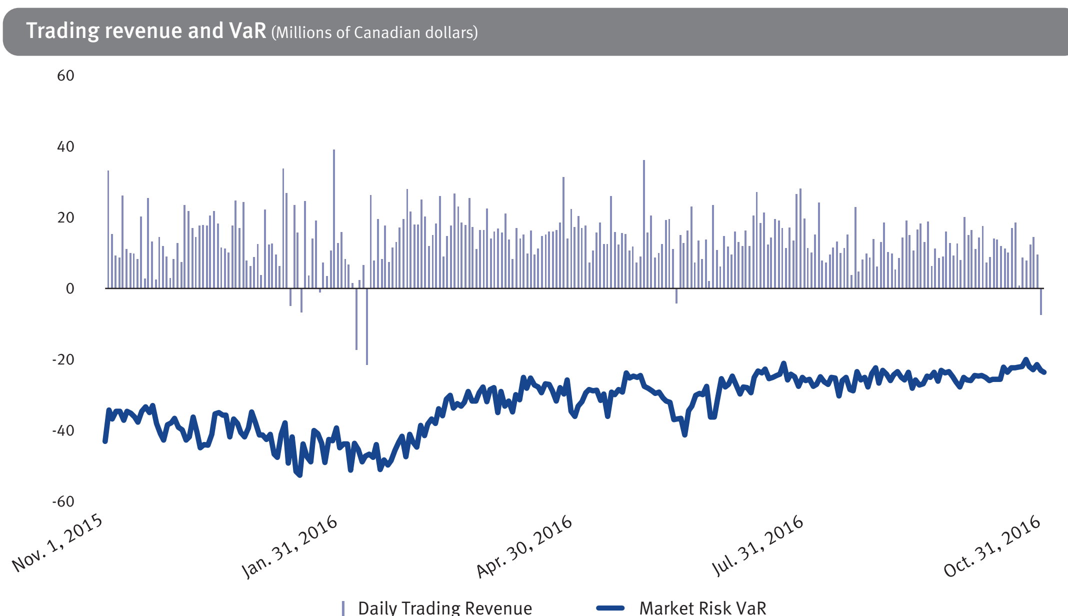
(1) General credit spread risk is measured under interest rate VaR while credit specific risk captures issuer-specific credit spread volatility.

(2) Market risk VaR is less than the sum of the individual risk factor VaR results due to portfolio diversification.

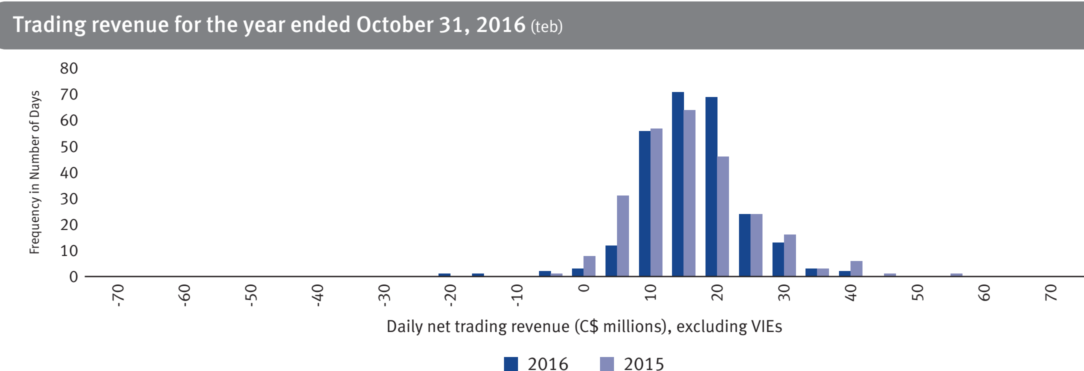
2016 vs. 2015
Average market risk VaR of $33 million remained unchanged from the prior year. Reduced inventories in fixed income and securitized product portfolios, as reflected in lower average interest rate and credit specific VaR in the year, and the impact from foreign exchange translation were offset by an increase in equity risk mainly attributable to client-driven activity and increased volatility in the historical window used to calculate VaR.

Average SVaR of $82 million was down $22 million compared to last year largely due to the reduced inventories in fixed income and securitized product portfolios as noted above and reduced risk in certain legacy businesses. During Q4 2016, SVaR reached the lowest level observed during the two-year period encompassing fiscal 2015 and 2016.

The following chart graphically displays a bar chart of our daily trading profit and loss and a line chart of our daily market risk VaR. We incurred net trading losses on 7 days in the year totalling $63 million, as compared to 9 days of losses totalling $25 million in 2015, with none of the losses exceeding VaR.



The following chart displays the distribution of daily trading profit and loss in 2016. The largest daily reported loss of $22 million on February 11, 2016 was primarily driven by volatility in equities and credit spreads resulting from global growth concerns. Of the 7 loss days in fiscal 2016, 1 occurred in the fourth quarter. This loss day was largely driven by market conditions that negatively impacted trading activity across major business lines. The largest reported profit was $39 million with an average daily profit of $14 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 fair value through profit or loss (FVTPL). Consequently, changes in the fair values of these assets are recorded in investment income in the consolidated statements of income and are largely offset by changes in the fair value of the actuarial liabilities, the impact of which is reflected in insurance policyholder benefits and claims. As at October 31, 2016, we had liabilities with respect to insurance obligations of $9.2 billion, up from $9.1 billion in the prior year, and trading securities of $7.2 billion in support of the liabilities, unchanged from 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 of Directors approves the risk appetite for SIRR, and the Asset-Liability Committee (ALCO), along with GRM, provides ongoing oversight of SIRR 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 of Directors.

Details on the non-trading risks included in SIRR are outlined in Table 60.

Structural Interest Rate Risk measurement

To monitor and control SIRR, the Bank assesses two primary financial metrics, 12-month Net Interest Income (NII) risk and Economic Value of Equity (EVE) risk, under a range of market shocks and scenarios. 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 using monthly time steps over a one-year horizon. The simulations incorporate product maturities, renewals and growth along with prepayment and redemption behaviour. Product pricing and volumes are calibrated from past experience and projected consistent with expectations for a given market stress scenario. EVE risk captures the market value sensitivity of structural positions to changes in longer-term 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 market rate changes, across interest rate curves and interest rate volatilities.

The management of NII and EVE risks is complementary and supports efforts by the Bank to generate a sustainable high-quality NII stream. NII and EVE risks are measured daily, weekly or monthly depending on the size, complexity and hedge strategy applicable to a balance sheet or business activity.

A number of assumptions affecting cash flows, product re-pricing and the administration of rates underlie the models used to measure NII and EVE risks. The key assumptions pertain to the expected funding profiles for retail mortgage rate commitments, prepayment behaviour for fixed-rate loans, term deposit redemption behaviour, and the treatment of non-maturity deposits. All assumptions are derived empirically from historical client and product experience and consider future product pricing and customer needs. 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 the Bank's non-trading balance sheet, assuming no subsequent hedging. Rate floors are applied within the declining rates scenarios, with floor levels set based on global rate movement experience. Interest rate risk measures are based upon interest rate exposures at a specific time and continuously change as a result of business activities and risk management actions.

Market risk – SIRR measures* **Table 59**

	2016						2015		2014	
	Economic value of equity risk			Net interest income risk (1)						
(Millions of Canadian dollars)	Canadian dollar impact	U.S. dollar impact (2)	Total	Canadian dollar impact	U.S. dollar impact (2)	Total	Economic value of equity risk	Net interest income risk (2)	Economic value of equity risk	Net interest income risk (2)
Before-tax impact of:										
100bps increase in rates	$ (1,321)	$ (56)	$(1,377)	$ 235	$ 185	$ 420	$ (1,072)	$ 289	$ (916)	$ 414
100bps decrease in rates	1,083	(439)	644	(300)	(165)	(465)	829	(370)	754	(348)
Before-tax impact of:										
200bps increase in rates	(2,682)	(201)	(2,883)	344	367	711	(2,221)	472	(1,910)	763
200bps decrease in rates	1,105	(441)	664	(290)	(177)	(467)	925	(379)	1,259	(434)

* This table represents an integral part of our audited 2016 Annual Consolidated Financial Statements.

(1) Represents the 12-month Net interest income exposure to an instantaneous and sustained shift in interest rates.

(2) Represents the impact on the SIRR portfolios held in our U.S. banking operations.

At the end of fiscal 2016, an immediate and sustained -100 bps shock would have had a negative impact to the Bank's NII of $465 million, up from $370 million at the end of 2015. An immediate and sustained +100 bps shock at the end of fiscal 2016 would have had a negative impact to the Bank's EVE of $1,377 million, up from $1,072 million in 2015. The year-over-year increases in NII and EVE risks are primarily attributed to our acquisition of City National and growth in our balance sheet, in particular the fixed-rate asset position. During fiscal 2016, NII and EVE risks were maintained well within approved limits.

Market risk measures for other material non-trading portfolios

AFS securities

We held $70 billion of securities classified as AFS as at October 31, 2016, compared to $48 billion as at October 31, 2015. Growth in AFS securities was primarily driven by the consolidation of the City National AFS portfolio. We hold debt securities designated as AFS primarily as investments and to manage liquidity and interest rate risk in our non-trading banking activity. Certain legacy debt portfolios are also classified as AFS. As at October 31, 2016, our portfolio of AFS securities exposes us to interest rate risk of a pre-tax loss of $8.9 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 loss of $22.8 million, as measured by the change in value for a one basis point widening of credit spreads. Changes in the value of these securities are reported in other comprehensive income. The value of the AFS securities included in our SIRR measure as at October 31, 2016 was $48.6 billion. Our AFS securities also include equity exposures of $1.6 billion as at October 31, 2016, down from $1.8 billion as at October 31, 2015.

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

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 $5.1 billion as at October 31, 2016 were down from $6.4 billion as at October 31, 2015, and derivative liabilities of $4.1 billion as at October 31, 2016 were down from $4.5 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 $2.4 billion as at October 31, 2016, down from $2.8 billion as at October 31, 2015, and derivative liabilities of $1.8 billion as at October 31, 2016, down from $2.0 billion last year. These derivative assets and liabilities are included in our Structural Interest Rate Risk measure and other internal non-trading market risk measures. We use interest rate swaps to manage our AFS securities and structural interest rate risk, as described above. To the extent these swaps are considered effective hedges, changes in their fair value are recognized in other comprehensive income. The interest rate risk for the designated cash flow hedges, measured as the change in the fair value of the derivatives for a one basis point parallel increase in yields, was $5.2 million as of October 31, 2016 compared to $5.5 million as of October 31, 2015.

Interest rate swaps are also used to hedge changes in the fair value of certain fixed-rate instruments. Changes in fair value of the interest rate swaps and the hedged instruments that are related to interest rate movements are reflected in 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 other comprehensive income.

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. These derivatives have been designated as FVTPL, with changes in the fair value of these derivatives reflected in income. Derivative assets of $2.7 billion as at October 31, 2016 on these trades were down from $3.6 billion as at October 31, 2015, and derivative liabilities of $2.3 billion as at October 31, 2016 were down from $2.5 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 level of 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.

Our overall trading and non-trading market risk objectives, policies and methodologies have not changed significantly from 2015.

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 60**

	As at October 31, 2016			
		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)	$ 14,929	$ 5,906	$ 9,023	Interest rate
Interest-bearing deposits with banks (4)	27,851	16,058	11,793	Interest rate
Securities				
Trading (5)	151,292	144,001	7,291	Interest rate, credit spread
Available-for-sale (6)	84,801	–	84,801	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed (7)	186,302	186,033	269	Interest rate
Loans				
Retail (8)	369,470	9,081	360,389	Interest rate
Wholesale (9)	154,369	2,341	152,028	Interest rate
Allowance for loan losses	(2,235)	–	(2,235)	Interest rate
Segregated fund net assets (10)	981	–	981	Interest rate
Derivatives	118,944	113,862	5,082	Interest rate, foreign exchange
Other assets (11)	68,353	24,727	43,626	Interest rate
Assets not subject to market risk (12)	5,201			
Total assets	$ 1,180,258	$ 502,009	$ 673,048	
Liabilities subject to market risk				
Deposits (13)	$ 757,589	$ 118,815	$ 638,774	Interest rate
Segregated fund liabilities (14)	981	–	981	Interest rate
Other				
Obligations related to securities sold short	50,369	50,369	–	
Obligations related to assets sold under repurchase agreements and securities loaned	103,441	103,441	–	Interest rate
Derivatives	116,550	112,500	4,050	Interest rate, foreign exchange
Other liabilities (15)	61,987	19,984	42,003	Interest rate
Subordinated debentures	9,762	–	9,762	Interest rate
Liabilities not subject to market risk (16)	7,967			
Total liabilities	$ 1,108,646	$ 405,109	$ 695,570	
Total equity	$ 71,612			
Total liabilities and equity	$ 1,180,258			

(1) Traded risk includes FVTPL positions whose revaluation gains and losses are reported in revenue. Market risk measures of VaR, 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 our Insurance business 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 $8,954 million included in SIRR. An additional $69 million is included in other risk controls.
(4) Interest-bearing deposits with banks of $11,793 million are included in SIRR.
(5) Trading securities include $7,291 million in securities used in the management of the SIRR of RBC Insurance, which is not included in our disclosed SIRR measure.
(6) Includes available-for-sale securities of $69,922 million and held-to-maturity securities of $14,879 million. $63,475 million of the total securities are included in SIRR. An additional $1,901 million are held by our insurance businesses that do not contribute to our disclosed SIRR measures. The remaining $19,425 million are captured in other internal non-trading market risk reporting.
(7) Assets purchased under reverse repurchase agreements include $269 million reflected in SIRR.
(8) Retail loans include $360,138 million reflected in SIRR. An additional $251 million is used in the management of the SIRR of RBC Insurance.
(9) Wholesale loans include $150,619 million reflected in SIRR. An additional $1,409 million is used in the management of the SIRR of RBC Insurance.
(10) Investments for the account of segregated fund holders are included in the management of the SIRR of RBC Insurance.
(11) Other assets include $41,168 million reflected in SIRR. An additional $2,458 million is used in the management of the SIRR of RBC Insurance.
(12) Assets not subject to market risk include $5,201 million of physical and other assets.
(13) Deposits include $638,774 million reflected in SIRR.
(14) Insurance and investment contracts for the account of segregated fund holders are included in the management of the SIRR of RBC Insurance.
(15) Other liabilities include $9,900 million used in the management of the SIRR of RBC Insurance and $32,103 million contribute to our SIRR measure.
(16) Liabilities not subject to market risk include $7,967 million of payroll related and other liabilities.

(Millions of Canadian dollars)	As at October 31, 2015			
		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)	$ 12,452	$ 5,720	$ 6,732	Interest rate
Interest-bearing deposits with banks (4)	22,690	15,764	6,926	Interest rate
Securities				
Trading (5)	158,703	151,420	7,283	Interest rate, credit spread
Available-for-sale (6)	56,805	–	56,805	Interest rate, credit spread, equity
Assets purchased under reverse repurchase agreements and securities borrowed (7)	174,723	174,594	129	Interest rate
Loans				
Retail (8)	348,183	16,337	331,846	Interest rate
Wholesale (9)	126,069	140	125,929	Interest rate
Allowance for loan losses	(2,029)	–	(2,029)	Interest rate
Segregated fund net assets (10)	830	–	830	Interest rate
Derivatives	105,626	99,233	6,393	Interest rate, foreign exchange
Other assets (11)	64,082	24,578	39,504	Interest rate
Assets not subject to market risk (12)	6,074			
Total assets	$ 1,074,208	$ 487,786	$ 580,348	
Liabilities subject to market risk				
Deposits (13)	$ 697,227	$ 151,776	$ 545,451	Interest rate
Segregated fund liabilities (14)	830	–	830	Interest rate
Other				
Obligations related to securities sold short	47,658	47,658	–	
Obligations related to assets sold under repurchase agreements and securities loaned (15)	83,288	83,165	123	Interest rate
Derivatives	107,860	103,348	4,512	Interest rate, foreign exchange
Other liabilities (16)	58,184	19,757	38,427	Interest rate
Subordinated debentures	7,362	–	7,362	Interest rate
Liabilities not subject to market risk (17)	7,855			
Total liabilities	$ 1,010,264	$ 405,704	$ 596,705	
Total equity	$ 63,944			
Total liabilities and equity	$ 1,074,208			

(1) Traded risk includes FVTPL positions whose revaluation gains and losses are reported in revenue. Market risk measures of VaR, 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 our Insurance business 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 $5,829 million included in SIRR. An additional $903 million is included in other risk controls.
(4) Interest-bearing deposits with banks of $6,926 million are included in SIRR.
(5) Trading securities include $7,283 million in securities used in the management of the SIRR of RBC Insurance, which is not included in our disclosed SIRR measure.
(6) Includes available-for-sale securities of $48,164 million and held-to-maturity securities of $8,641 million. $43,528 million of the total securities are included in SIRR. An additional $1,917 million are held by our insurance businesses that do not contribute to our disclosed SIRR measures. The remaining $11,360 million are captured in other internal non-trading market risk reporting.
(7) Assets purchased under reverse repurchase agreements include $129 million reflected in SIRR.
(8) Retail loans include $331,846 million reflected in SIRR.
(9) Wholesale loans include $124,701 million reflected in SIRR. An additional $1,228 million is used in the management of the SIRR of RBC Insurance.
(10) Investments for the account of segregated fund holders are included in the management of the SIRR of RBC Insurance.
(11) Other assets include $36,728 million reflected in SIRR. An additional $2,776 million is used in the management of the SIRR of RBC Insurance.
(12) Assets not subject to market risk include $6,074 million of physical and other assets.
(13) Deposits include $545,451 million reflected in SIRR.
(14) Insurance and investment contracts for the account of segregated fund holders are included in the management of the SIRR of RBC Insurance.
(15) Obligations related to assets sold under repurchase agreements include $123 million reflected in SIRR.
(16) Other liabilities include $10,019 million used in the management of the SIRR of RBC Insurance, and $28,408 million contribute to our SIRR measure.
(17) Liabilities not subject to market risk include $7,855 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 business and liquidity environments. To achieve these goals, we operate under a comprehensive Liquidity Risk Management Framework (LRMF) and employ several liquidity risk mitigation strategies that include:

- An appropriate balance between the level of exposure allowed under our risk appetite and the cost of risk mitigation;
- Broad funding access, including preserving and promoting a reliable base of core client deposits and ongoing access to diversified sources of wholesale funding;
- 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;
- Timely and granular risk measurement information;
- Transparent liquidity transfer pricing and cost allocation; and
- A rigorous first and second line 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, to align with local regulatory developments and to position ourselves for the phase-in of Basel III regulatory liquidity standards. 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 of Directors 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 of Directors, the Risk Committee of the Board, the Group Risk Committee (GRC) and the Asset/Liability Committee (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 of Directors or its committees.

- PRC annually approves the Liquidity Risk Policy (LRP), which establishes minimum risk control elements in accordance with the Board-approved risk appetite and 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-based assumptions against our assets and liabilities and off-balance sheet commitments to derive expected cash flow profiles over varying time horizons. For instance, government bonds can be quickly and reliably monetized without significant loss of value to generate cash inflow prior to their contractual maturity, and similarly, relationship demand deposits can be deemed as having little risk of short-term cash outflow, although depositors have the contractual right to redeem on demand. Risk methodologies and underlying assumptions are periodically reviewed and validated to ensure 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 focus on 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 more immediate cash flow risks we may experience in times of stress, we use short-term net cash flow limits in conjunction with stress testing, to contain risk within the risk appetite at branch, subsidiary and currency levels. Net cash flow positions are derived from the application of internally generated 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 group-wide and unit-specific prescribed regulatory standards, such as LCR.

Contingency liquidity risk

Contingency liquidity risk planning assesses the impact of and our intended responses to sudden stressful events. Our Liquidity Contingency Plan, maintained and administered by Corporate Treasury, guides our actions and responses to liquidity crises. This plan establishes a Liquidity Crisis Team, led by Corporate Treasury, and consisting of senior representatives with relevant subject matter expertise from key business segments, Group Risk Management, Finance, and Operations. This team contributes to the development of stress tests and funding plans and meets regularly to assess our liquidity status, conduct stress tests and review liquidity contingency preparedness.

Our stress tests, which include elements of scenario and sensitivity analyses, measure our prospective exposure to global, country-specific 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 notch 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 contingent unencumbered liquid asset pools.

Our contingent liquid asset pools 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 strict eligibility guidelines (e.g., maturity, diversification and eligibility for central bank advances) to maximize ready access to cash in emergencies. These securities, when added to other unencumbered liquid assets that we hold as a result of capital markets or other activities, combine to populate our liquidity reserve and asset encumbrance disclosures provided below.

Liquidity reserve and asset encumbrance

As recommended by the Enhanced Disclosure Task Force (EDTF), 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. For the purpose of constructing the following tables, 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, we do not include encumbered assets as a source of available liquidity in measuring liquidity risk. Unencumbered assets 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 the preferred source for quickly accessing 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.

Liquidity reserve — **Table 61**

	As at October 31, 2016				
(Millions of Canadian dollars)	**Bank-owned liquid assets (1)**	**Securities received as collateral from securities financing and derivative transactions**	**Total liquid assets**	**Encumbered liquid assets**	**Unencumbered liquid assets**
Cash and holding at central banks	**$ 31,771**	**$ –**	**$ 31,771**	**$ 1,781**	**$ 29,990**
Deposits in other banks available overnight	**1,679**	**–**	**1,679**	**262**	**1,417**
Securities issued or guaranteed by sovereigns, central banks or multicultural development banks (2)	**295,603**	**28,564**	**324,167**	**168,395**	**155,772**
Other	**146,269**	**34,386**	**180,655**	**72,765**	**107,890**
Liquidity assets eligible at central banks (not included above) (3)	**600**	**–**	**600**	**–**	**600**
Undrawn credit lines granted by central banks (4)	**13,558**	**–**	**13,558**	**–**	**13,558**
Other assets eligible as collateral for discount (5)	**141,888**	**–**	**141,888**	**–**	**141,888**
Other liquid assets (6)	**23,307**	**–**	**23,307**	**23,307**	**–**
Total liquid assets	**$ 654,675**	**$ 62,950**	**$ 717,625**	**$ 266,510**	**$ 451,115**

	As at October 31, 2015				
(Millions of Canadian dollars)	Bank-owned liquid assets (1)	Securities received as collateral from securities financing and derivative transactions	Total liquid assets	Encumbered liquid assets	Unencumbered liquid assets
Cash and holding at central banks	$ 25,075	$ –	$ 25,075	$ 1,719	$ 23,356
Deposits in other banks available overnight	2,298	–	2,298	1	2,297
Securities issued or guaranteed by sovereigns, central banks or multilateral development banks (2)	257,338	21,216	278,554	127,702	150,852
Other	142,713	31,751	174,464	80,349	94,115
Liquidity assets eligible at central banks (not included above) (3)	63	–	63	–	63
Undrawn credit lines granted by central banks (4)	11,844	–	11,844	–	11,844
Other assets eligible as collateral for discount (5)	128,401	–	128,401	–	128,401
Other liquid assets (6)	21,675	–	21,675	21,675	–
Total liquid assets	$ 589,407	$ 52,967	$ 642,374	$ 231,446	$ 410,928

	As at	
(Millions of Canadian dollars)	**October 31 2016**	October 31 2015
Royal Bank of Canada	**$ 264,522**	$ 252,052
Foreign branches	**53,006**	64,684
Subsidiaries	**133,587**	94,192
Total unencumbered liquid assets	**$ 451,115**	$ 410,928

(1) The bank-owned liquid assets amount includes securities owned outright by the bank as well as collateral received through reverse repurchase transactions.

(2) 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).

(3) Includes Auction Rate Securities.

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

(5) 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 Bank of Canada for advances under its Emergency Lending Assistance (ELA) program. ELA and other central bank facilities 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 central bank collateral to meet requirements and mitigate further market liquidity disruption.

(6) Represents pledges related to OTC and exchange-traded derivative transactions.

2016 vs. 2015

Total liquid assets increased $75.3 billion or 12%, primarily due to our acquisition of City National as well as an increase in collateral received under reverse repurchase and securities financing transactions.

Asset encumbrance

The table below provides a summary of cash, securities and other assets, distinguishing between those that are encumbered assets and those available for sale or use as collateral in secured funding transactions. Other assets, such as mortgages and credit card receivables can also be monetized, although over a longer timeframe than that required for marketable securities. As at October 31, 2016, our Unencumbered assets available as collateral comprised 38% of our total assets (October 31, 2015 – 38%).

Asset encumbrance **Table 62**

	As at									
	October 31 2016					October 31 2015				
	Encumbered		Unencumbered			Encumbered		Unencumbered		
(Millions of Canadian dollars)	Pledged as collateral	Other (1)	Available as collateral (2)	Other (3)	Total (4)	Pledged as collateral	Other (1)	Available as collateral (2)	Other (3)	Total (4)
Cash and due from banks	$ –	$ 1,781	$ 13,148	$ –	$ 14,929	$ –	$ 1,719	$ 10,733	$ –	$ 12,452
Interest-bearing deposits with banks	–	262	27,589	–	27,851	1	–	22,689	–	22,690
Securities										
Trading	66,734	–	83,219	1,339	151,292	66,752	–	90,551	1,400	158,703
Available-for-sale	2,858	–	78,966	2,977	84,801	7,800	669	45,548	2,788	56,805
Assets purchased under reverse repurchase agreements and securities borrowed	179,534	–	89,200	15,204	283,938	148,117	–	89,929	18,398	256,444
Loans										
Retail										
Mortgage securities	34,624	–	35,591	–	70,215	35,889	–	33,921	–	69,810
Mortgage loans	40,293	–	12,796	131,694	184,783	36,422	–	–	127,743	164,165
Non-mortgage loans	10,422	–	100,612	3,438	114,472	8,314	–	100,040	5,854	114,208
Wholesale	3,477	–	41,445	109,447	154,369	3,376	–	40,867	81,826	126,069
Allowance for loan losses	–	–	–	(2,235)	(2,235)	–	–	–	(2,029)	(2,029)
Segregated fund net assets	–	–	–	981	981	–	–	–	830	830
Other – Derivatives	–	–	–	118,944	118,944	–	–	–	105,626	105,626
– Others (5)	23,307	–	–	50,247	73,554	22,286	–	–	47,870	70,156
Total assets	$361,249	$ 2,043	$ 482,566	$ 432,036	$ 1,277,894	$ 328,957	$ 2,388	$ 434,278	$ 390,306	$ 1,155,929

(1) Includes assets restricted from use to generate secured funding due to legal or other constraints.

(2) Includes loans that could be used to collateralize central bank advances. Our unencumbered Canadian dollar non-mortgage loan book (at face value) could, subject to satisfying conditions for borrowing and application of prescribed collateral margin requirements, be pledged to the Bank of Canada for advances under its ELA program. We also lodge loans that qualify as eligible collateral for the discount window facility available to us at the Federal Reserve Bank of New York. ELA and other central bank facilities are not considered sources of available liquidity in our normal liquidity risk profile. However, banks could monetize assets meeting central bank collateral criteria during periods of extraordinary and severe disruption to market-wide liquidity.

(3) Other unencumbered assets are not subject to any restrictions on their use to secure funding or as collateral but would not be considered readily available since they may not be acceptable at central banks or for other lending programs.

(4) Includes bank-owned liquid assets and securities received as collateral from off-balance sheet securities financing and derivative transactions.

(5) The Pledged as collateral amounts relate 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, 2016, relationship-based deposits, which are the primary source of funding for retail loans and mortgages, were $506 billion or 55% of our total funding (October 31, 2015 – $422 billion or 51%). 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 2016, we continued to experience more favourable unsecured wholesale funding access and pricing compared to many of our global peers. We also continued to expand our unsecured long-term funding base by selectively issuing, either directly or through our subsidiaries, $25.4 billion of term funding in various currencies and markets. Total unsecured long-term funding outstanding decreased by $3.3 billion from the prior year due to 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 2015, our outstanding MBS sold decreased $2.2 billion. Our covered bonds and securitized credit card receivables increased $3.2 billion and $744 million.

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

Long-term funding sources* **Table 63**

(Millions of Canadian dollars)	As at October 31 2016	As at October 31 2015
Unsecured long-term funding	$ 98,827	$ 102,081
Secured long-term funding	69,971	68,228
Commercial mortgage-backed securities sold	1,297	1,080
Subordinated debentures	9,597	7,227
	$ 179,692	$ 178,616

* This table represents an integral part of our 2016 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.

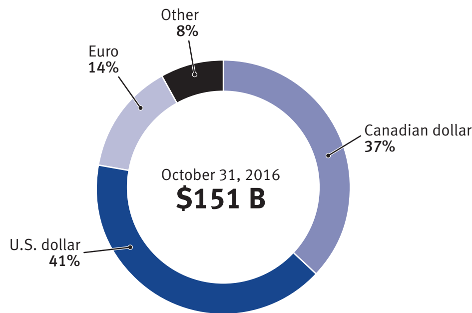
Programs by geography **Table 64**

Canada	U.S.	Europe/Asia
• Canadian Shelf – $25 billion	• SEC Registered Medium Term Note Program – US$40 billion • SEC Registered Covered Bond Program – US$15 billion (1)	• European Debt Issuance Program – US$40 billion • Global Covered Bond Program – €32 billion • Japanese Issuance Programs – ¥1 trillion

(1) Subject to the €32 billion Global Covered Bond Program limit.

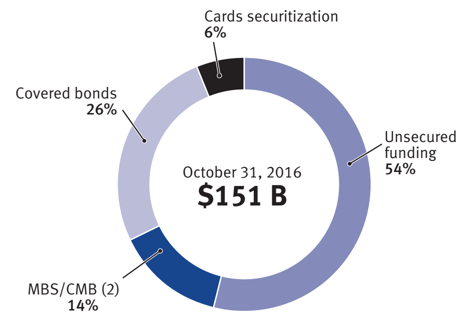
We also raise long-term funding using Canadian Deposit Notes, Canadian NHA MBS, Canada Mortgage Bonds, credit card receivable-backed securities, Kangaroo Bonds (issued in the Australian domestic market by foreign firms) and Yankee Certificates of Deposit (issued in the U.S. domestic market by foreign 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
($151 billion as at October 31, 2016)



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

Long-term debt (1) – funding mix by product
($151 billion as at October 31, 2016)



(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 and represents our enhanced disclosure in response to EDTF recommendations:

Composition of wholesale funding (1) **Table 65**

	As at October 31, 2016							
(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)	$ 1,375	$ 80	$ 30	$ 38	$ 1,523	$ –	$ –	$ 1,523
Certificates of deposit and commercial paper	3,072	8,950	10,692	5,199	27,913	1,220	54	29,187
Asset-backed commercial paper (3)	1,503	1,600	3,551	2,923	9,577	–	–	9,577
Senior unsecured medium-term notes (4)	1,135	9,140	7,582	7,282	25,139	18,156	43,073	86,368
Senior unsecured structured notes (5)	141	305	213	554	1,213	1,871	6,493	9,577
Mortgage securitization	–	686	514	1,435	2,635	3,432	14,378	20,445
Covered bonds/asset-backed securities (6)	–	1,674	626	5,834	8,134	10,700	30,692	49,526
Subordinated liabilities	–	–	–	128	128	–	9,469	9,597
Other (7)	1,173	2,053	43	738	4,007	13	5,073	9,093
Total	**$ 8,399**	**$ 24,488**	**$ 23,251**	**$ 24,131**	**$ 80,269**	**$ 35,392**	**$ 109,232**	**$ 224,893**
Of which:								
– Secured	$ 2,502	$ 5,528	$ 4,691	$ 10,192	$ 22,913	$ 14,132	$ 45,071	$ 82,116
– Unsecured	5,897	18,960	18,560	13,939	57,356	21,260	64,161	142,777

	As at October 31, 2015							
(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)	$ 5,107	$ 62	$ 13	$ 30	$ 5,212	$ –	$ –	$ 5,212
Certificates of deposit and commercial paper	9,355	9,648	18,591	10,071	47,665	451	207	48,323
Asset-backed commercial paper (3)	883	2,317	6,989	1,572	11,761	–	–	11,761
Senior unsecured medium-term notes (4)	944	6,403	4,165	11,348	22,860	17,670	42,520	83,050
Senior unsecured structured notes (5)	151	535	376	577	1,639	679	6,070	8,388
Mortgage securitization	41	1,088	673	2,139	3,941	2,656	16,049	22,646
Covered bonds/asset-backed securities (6)	–	1,961	654	5,438	8,053	7,518	30,041	45,612
Subordinated liabilities	1,500	–	–	–	1,500	108	5,619	7,227
Other (7)	4,126	3,283	252	1,318	8,979	12	4,408	13,399
Total	$ 22,107	$ 25,297	$ 31,713	$ 32,493	$111,610	$ 29,094	$ 104,914	$ 245,618
Of which:								
– Secured	$ 4,952	$ 7,506	$ 8,315	$ 9,149	$ 29,922	$ 10,174	$ 46,090	$ 86,186
– Unsecured	17,155	17,791	23,398	23,344	81,688	18,920	58,824	159,432

(1) Excludes bankers' acceptances and repos.
(2) Only includes deposits raised by treasury. Excludes deposits associated with services we provide to these 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, auto and mortgage loans.
(7) Includes tender option bonds (secured) of $2,567 million (October 31, 2015 – $6,088 million), bearer deposit notes (unsecured) of $1,652 million (October 31, 2015 – $3,186 million) and other long-term structured deposits (unsecured) of $4,874 million (October 31, 2015 – $4,125 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 and liquidity and other factors not completely within our control.

On June 6, 2016, S&P revised our outlook to negative from stable and affirmed our ratings.
On July 19, 2016, Moody's affirmed our ratings with a negative outlook.
On July 28, 2016, DBRS affirmed our ratings with a negative outlook.
On October 28, 2016, Fitch Ratings affirmed our ratings with a negative outlook.

The following table presents our major credit ratings (1) and outlooks:

Credit ratings — **Table 66**

	As at November 29, 2016		
	Short-term debt	Senior long-term debt	Outlook
Moody's	P-1	Aa3	negative
Standard & Poor's	A-1+	AA-	negative
Fitch Ratings	F1+	AA	negative
Dominion Bond Rating Services	R-1(high)	AA	negative

(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.

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 presents 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 67**

	As at					
	October 31 2016			October 31 2015		
(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	$ 487	$ 117	$ 501	$ 760	$ 132	$ 972
Other contractual funding or margin requirements (1)	293	473	–	421	88	–

(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 HQLA available to meet liquidity needs over a 30-day period in an acute stress scenario. The BCBS and OSFI regulatory minimum coverage level for LCR is currently 100%.

OSFI requires Canadian banks to disclose the LCR using the standard Basel disclosure template and calculated using the average of month-end positions during the quarter.

Liquidity coverage ratio (1) **Table 68**

(Millions of Canadian dollars, except percentage amounts)	For the three-months ended			
	October 31 2016		October 31 2015	
	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)		**207,541**		194,785
Cash outflows				
Retail deposits and deposits from small business customers, of which:	**224,518**	**17,372**	180,831	13,856
Stable deposits (3)	**72,570**	**2,177**	60,399	1,813
Less stable deposits	**151,948**	**15,195**	120,432	12,043
Unsecured wholesale funding, of which:	**234,455**	**99,877**	217,592	97,305
Operational deposits (all counterparties) and deposits (4) *in networks of cooperative banks*	**106,040**	**25,491**	97,255	23,342
Non-operational deposits	**113,719**	**59,690**	101,632	55,258
Unsecured debt	**14,696**	**14,696**	18,705	18,705
Secured wholesale funding		**26,069**		26,709
Additional requirements, of which:	**226,706**	**67,106**	195,694	51,288
Outflows related to derivative exposures and other collateral requirements	**59,910**	**34,299**	43,709	17,747
Outflows related to loss of funding on debt products	**5,364**	**5,364**	4,893	4,893
Credit and liquidity facilities	**161,432**	**27,443**	147,092	28,648
Other contractual funding obligations (5)	**30,951**	**30,951**	28,056	28,056
Other contingent funding obligations (6)	**448,854**	**6,814**	433,181	6,224
Total cash outflows		**248,189**		223,438
Cash inflows				
Secured lending (e.g., reverse repos)	**126,615**	**31,978**	119,274	32,982
Inflows from fully performing exposures	**10,559**	**7,042**	11,709	8,013
Other cash inflows	**45,207**	**45,207**	29,309	29,309
Total cash inflows		**84,227**		70,304
		Total adjusted value		Total adjusted value
Total HQLA		**207,541**		194,785
Total net cash outflows		**163,962**		153,134
Liquidity coverage ratio		**127%**		127%

(1) LCR is calculated in accordance with OSFI's LAR guideline, which, in turn, reflects liquidity-related requirements issued by the BCBS.
(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 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 non-retail and non-small and medium-sized enterprise customers 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 management's 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 80% 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 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 management believes would be available to the Bank in a stress situation. All maturing wholesale debt is assigned 100% outflow in the LCR calculation.

Q4 2016 vs. Q4 2015

The average LCR for the quarter ended October 31, 2016 of 127% was consistent with the prior year, reflecting active liquidity management in response to balance sheet growth and funding maturities.

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 69**

	As at October 31, 2016									
(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	$ 38,931	$ 342	$ 2	$ –	$ 192	$ –	$ –	$ –	$ 3,313	$ 42,780
Securities										
Trading (1)	98,843	5	18	–	24	40	117	6,183	46,062	151,292
Available-for-sale	1,648	4,854	2,011	1,810	1,687	8,869	25,709	36,587	1,626	84,801
Assets purchased under reverse repurchase agreements and securities borrowed	81,801	42,092	24,771	14,988	11,090	3,380	303	–	7,877	186,302
Loans (net of allowance for loan losses)	15,526	13,154	16,863	21,512	23,120	109,075	198,054	38,887	85,413	521,604
Other										
Customers' liability under acceptances	8,362	4,403	73	3	–	–	2	–	–	12,843
Derivatives	8,443	10,367	4,800	3,355	3,511	12,794	26,563	49,099	12	118,944
Other financial assets	28,659	741	484	222	62	43	38	414	1,372	32,035
Total financial assets	$ 282,213	$ 75,958	$ 49,022	$ 41,890	$ 39,686	$ 134,201	$ 250,786	$ 131,170	$ 145,675	$ 1,150,601
Other non-financial assets	1,259	887	130	295	237	2,579	1,824	2,991	19,455	29,657
Total assets	$ 283,472	$ 76,845	$ 49,152	$ 42,185	$ 39,923	$ 136,780	$ 252,610	$ 134,161	$ 165,130	$ 1,180,258
Liabilities and equity										
Deposits (2)										
Unsecured borrowing	$ 30,680	$ 35,333	$ 35,540	$ 16,684	$ 23,586	$ 34,044	$ 55,239	$ 15,123	$ 415,130	$ 661,359
Secured borrowing	1,545	4,788	4,947	5,700	2,290	7,256	20,660	8,569	–	55,755
Covered bonds	–	–	–	–	3,348	9,376	24,936	2,815	–	40,475
Other										
Acceptances	8,362	4,403	73	3	–	–	2	–	–	12,843
Obligations related to securities sold short	50,369	–	–	–	–	–	–	–	–	50,369
Obligations related to assets sold under repurchase agreements and securities loaned	88,702	6,113	1,568	–	756	8	21	–	6,273	103,441
Derivatives	7,334	10,904	5,809	3,939	2,976	13,562	25,945	46,081	–	116,550
Other financial liabilities	22,700	2,212	375	125	218	154	290	4,762	482	31,318
Subordinated debentures	–	–	–	–	–	–	115	9,647	–	9,762
Total financial liabilities	$ 209,692	$ 63,753	$ 48,312	$ 26,451	$ 33,174	$ 64,400	$ 127,208	$ 86,997	$ 421,885	$ 1,081,872
Other non-financial liabilities	863	3,692	276	155	154	1,199	2,466	9,408	8,561	26,774
Equity	–	–	–	–	–	–	–	–	71,612	71,612
Total liabilities and equity	$ 210,555	$ 67,445	$ 48,588	$ 26,606	$ 33,328	$ 65,599	$ 129,674	$ 96,405	$ 502,058	$ 1,180,258
Off-balance sheet items										
Financial guarantees	$ 736	$ 2,255	$ 1,897	$ 3,199	$ 1,251	$ 3,010	$ 6,403	$ 79	$ 56	$ 18,886
Lease commitments	62	123	184	181	177	661	1,528	2,131	–	5,047
Commitments to extend credit	3,723	5,481	9,783	7,190	12,074	31,384	132,092	18,284	3,220	223,231
Other credit-related commitments	433	791	1,420	1,339	1,158	678	758	306	90,241	97,124
Other commitments	477	63	–	–	–	–	–	–	–	540
Total off-balance sheet items	$ 5,431	$ 8,713	$ 13,284	$ 11,909	$ 14,660	$ 35,733	$ 140,781	$ 20,800	$ 93,517	$ 344,828

(1) Trading debt securities classified as fair value through profit or loss have been included in the less than 1 month category as there is no expectation to hold these assets to their contractual maturity.

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

	As at October 31, 2015									
(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	$ 31,355	$ 56	$ 17	$ 530	$ –	$ –	$ –	$ –	$ 3,184	$ 35,142
Securities										
Trading (1)	103,718	21	26	77	51	188	552	5,580	48,490	158,703
Available-for-sale	2,947	3,682	1,345	3,259	988	4,778	20,154	17,802	1,850	56,805
Assets purchased under reverse repurchase agreements and securities borrowed	82,017	30,851	27,871	16,570	7,320	2,601	–	–	7,493	174,723
Loans (net of allowance for loan losses)	15,020	11,828	23,196	22,295	18,234	89,179	184,249	22,833	85,389	472,223
Other										
Customers' liability under acceptances	10,343	3,032	71	–	–	6	1	–	–	13,453
Derivatives	7,492	8,129	3,747	3,074	2,479	10,639	25,244	44,811	11	105,626
Other financial assets	29,187	624	711	169	33	83	26	525	966	32,324
Total financial assets	$ 282,079	$58,223	$56,984	$45,974	$29,105	$ 107,474	$ 230,226	$ 91,551	$147,383	$1,048,999
Other non-financial assets	1,792	1,506	526	374	60	866	1,573	2,425	16,087	25,209
Total assets	$ 283,871	$59,729	$57,510	$46,348	$29,165	$ 108,340	$ 231,799	$ 93,976	$163,470	$1,074,208
Liabilities and equity										
Deposits (2)										
Unsecured borrowing	$ 40,992	$29,994	$41,298	$20,175	$27,220	$ 30,697	$ 53,403	$ 14,479	$338,378	$ 596,636
Secured borrowing	970	4,818	8,602	7,567	2,676	9,708	19,318	9,736	–	63,395
Covered bonds	–	1,961	–	2,293	1,165	3,269	24,064	4,444	–	37,196
Other										
Acceptances	10,343	3,032	71	–	–	6	1	–	–	13,453
Obligations related to securities sold short	47,658	–	–	–	–	–	–	–	–	47,658
Obligations related to assets sold under repurchase agreements and securities loaned	66,099	7,580	1,419	422	800	780	10	–	6,178	83,288
Derivatives	5,376	8,481	4,146	4,205	3,884	12,240	28,140	41,383	5	107,860
Other financial liabilities	23,210	1,236	391	120	198	72	239	4,188	349	30,003
Subordinated debentures	–	–	–	–	–	–	–	7,362	–	7,362
Total financial liabilities	$ 194,648	$57,102	$55,927	$34,782	$35,943	$ 56,772	$ 125,175	$ 81,592	$344,910	$ 986,851
Other non-financial liabilities	990	3,291	170	142	169	894	2,564	8,522	6,671	23,413
Equity	–	–	–	–	–	–	–	–	63,944	63,944
Total liabilities and equity	$ 195,638	$60,393	$56,097	$34,924	$36,112	$ 57,666	$ 127,739	$ 90,114	$415,525	$1,074,208
Off-balance sheet items										
Financial guarantees	$ 828	$ 2,798	$ 1,348	$ 2,115	$ 1,552	$ 2,861	$ 5,813	$ 147	$ 32	$ 17,494
Lease commitments	62	123	180	175	177	602	1,293	1,808	–	4,420
Commitments to extend credit	3,801	6,005	9,854	10,976	8,281	32,971	127,747	14,127	3,113	216,875
Other credit-related commitments	623	828	1,172	1,169	1,014	343	834	272	74,247	80,502
Other commitments	353	–	–	–	–	–	–	–	–	353
Total off-balance sheet items	$ 5,667	$ 9,754	$12,554	$14,435	$11,024	$ 36,777	$ 135,687	$ 16,354	$ 77,392	$ 319,644

(1) Trading debt securities classified as fair value through profit or loss have been included in the less than 1 month category as there is no expectation to hold these assets to their contractual maturity.

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

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 70**

	As at October 31, 2016					
(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)	$ 358,254	$ 221,852	$ 50,293	$ 100,295	$ 25,422	$ 756,116
Other						
Acceptances	6,618	6,224	–	1	–	12,843
Obligations related to securities sold short	–	49,911	–	–	–	49,911
Obligations related to assets sold under repurchase agreements and securities loaned	6,274	97,139	8	21	–	103,442
Other liabilities	445	24,198	112	289	4,761	29,805
Subordinated debentures	–	–	–	115	9,646	9,761
	371,591	399,324	50,413	100,721	39,829	961,878
Off-balance sheet items						
Financial guarantees (2)	7,616	11,258	11	–	1	18,886
Operating leases	–	727	661	1,528	2,131	5,047
Commitments to extend credit (2)	181,496	41,671	5	59	–	223,231
	189,112	53,656	677	1,587	2,132	247,164
Total financial liabilities and off-balance sheet items	$ 560,703	$ 452,980	$ 51,090	$ 102,308	$ 41,961	$ 1,209,042

	As at October 31, 2015					
(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)	$ 311,743	$ 216,876	$ 43,631	$ 96,104	$ 28,539	$ 696,893
Other						
Acceptances	–	13,446	6	1	–	13,453
Obligations related to securities sold short	–	47,658	–	–	–	47,658
Obligations related to assets sold under repurchase agreements and securities loaned	6,179	76,320	780	10	–	83,289
Other liabilities	334	25,174	72	237	4,139	29,956
Subordinated debentures	–	–	–	–	7,227	7,227
	318,256	379,474	44,489	96,352	39,905	878,476
Off-balance sheet items						
Financial guarantees (2)	7,079	10,399	11	4	1	17,494
Operating leases	–	717	602	1,293	1,808	4,420
Commitments to extend credit (2)	172,927	43,929	4	2	13	216,875
	180,006	55,045	617	1,299	1,822	238,789
Total financial liabilities and off-balance sheet items	$ 498,262	$ 434,519	$ 45,106	$ 97,651	$ 41,727	$ 1,117,265

* This table represents an integral part of our 2016 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, as explained in the preceding Deposit profile section, for our operations and liquidity needs.
(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.

Insurance risk

Insurance risk refers to the potential financial loss that may arise where the amount, timing and/or frequency of benefit 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.

We have implemented an Insurance Risk Framework that provides an overview of our processes and tools for identifying, assessing, managing and reporting on the insurance risks that face the organization. Key insurance-specific processes and tools include: risk appetite, delegated authorities and risk limits, capital management, own risk and solvency assessment, comprehensive identification and assessment of risk process, stress testing, insurance product and project risk review and approval, insurance product pricing, reinsurance, insurance underwriting, insurance claims management, experience study analysis, actuarial liabilities, and embedded value.

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.

Three lines of defence

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 RBC. 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 & 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 (KRIs) 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 RBC 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 RBC 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.

Model risk

The use of models plays an important role in many of our business activities. We use a variety of models for many purposes, including the valuation of financial products, risk measurement and management of different types of risk. Model risk is the risk of error in the design, development, implementation or subsequent use of models. We have established an enterprise-wide Model Risk Management Policy, including principles, policies and procedures, roles and responsibilities to manage model risk. One of the key factors in the policy to mitigate model risk is independent validation.

Information technology and cybersecurity risk

We use information technology for business operations and the enablement of strategic business goals and objectives. Information technology risk is the risk to our business associated with the use, ownership, operation, involvement, influence and adoption of information technology within the enterprise. It consists of information technology related events (e.g., cybersecurity incidents) that could potentially have an adverse impact on our business. Such events could result in business interruption, service disruptions, theft of intellectual property and confidential information, additional regulatory scrutiny, litigation and reputational damage. To manage our information technology risk, we have established an enterprise-wide Information Technology Risk Management Framework.

Information management risk

Information management risk is the risk of loss or harm resulting from the failure to manage information appropriately throughout its life-cycle. Exposure to this risk exists when information is acquired or created, processed, used, shared, accessed, retained or disposed. With respect to personal information, the failure to manage information appropriately can result in the misuse of personal information or privacy breaches. With respect to client information, the inability to process information accurately and on a timely basis can result in service disruptions. With respect to corporate and proprietary information, the mismanagement of information can result in the disclosure of confidential information, the unavailability of information when it is required and the reliance on inaccurate information for decision-making purposes. Such events could lead to legal and regulatory consequences, reputational damage and financial loss.

Third-party and outsourcing risk
Failing to effectively manage our service providers may expose us to service disruptions, regulatory action, financial loss, litigation or reputational damage. Third-party and outsourcing risk has received increased oversight from regulators and attention from the media. We formalized and standardized our expectations of our suppliers with a principles-based supplier code of conduct to ensure their behaviour aligns with our standards in the following key areas: business integrity, responsible business practices, responsible treatment of individuals, and the environment.

Social media
The scale and profile of social media has grown to present a number of risks. These risks include brand and reputational damage, information leaks, non-compliance with regulatory requirements and governance risk. To manage the risks associated with social media, we have implemented an enterprise-wide policy as well as business unit policies on the usage of external social media, which sets out the requirements for the business and corporate use of social media and is part of our larger Social Media Governance Framework.

Processing and execution risk
Processing and execution risk is the risk of failure to effectively design, implement and execute a process. Exposure to this risk is global, existing in all of our locations and operations, and in our employee's actions. Examples of processing and execution events range from selecting the wrong interest rates, duplicating wire payment instructions, transposing figures, processing a foreign exchange transaction incorrectly, underinsuring a property and incorrectly investing funds. The potential impacts of such events include financial loss, legal and regulatory consequences and reputational damage. When identified, these situations are assessed, analyzed and mitigating actions are undertaken.

Fraud
Fraud risk is defined as the risk of intentional unauthorized activities designed to obtain benefits either from us or assets under our care, or using our products. Fraud can be initiated by one or more parties who can include employees, potential or existing clients, agents, suppliers or outsourcers, or other external parties. We have extensive professional resources allocated for the recovery of lost assets as a result of fraudulent activity or operational errors, as well as the improvement of loss avoidance experience through both enhanced intelligence and aggressive pursuit of those who attack enterprise assets.

Operational risk capital
On May 10, 2016, OSFI approved our application to use the Advanced Measurement Approach (AMA) for operational risk, subject to a capital floor. In Q3 2016, we formally began utilizing AMA to report regulatory capital.

Operational risk loss events
During 2016, we did not experience any material operational risk loss event. For further details on our contingencies, including litigation, refer to Notes 26 and 27 of our 2016 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 RBC, 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 to 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 licences or registrations that would damage our reputation and negatively impact our earnings. 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.

Global compliance has developed a Regulatory Compliance Management Framework consistent with regulatory expectations from OSFI and other regulators. The framework is designed to 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 has been further defined as risks associated with financial crime (which includes, but is not limited to, money laundering, bribery and sanctions), privacy, market conduct, consumer protection, business conduct and prudential requirements. Specific compliance policies, procedures and supporting frameworks have been developed to support the minimum requirements for the prudent management of regulatory compliance risk. Within the framework there are six elements that form a cycle by which all regulatory compliance risk management programs are developed, implemented and maintained.

The cycle revolves around and is informed by the people, processes, and technology that exist within the organization.

- Global compliance practices and methodologies: compliance policies, processes and methodologies that drive the regulatory compliance management approach.
- Regulatory compliance requirements: laws, rules and regulations with which we must comply.

- Risk assessment: identification and assessment of regulatory compliance risk to ensure appropriate risk-based monitoring and testing programs are in place.
- Monitoring and testing: risk-based activities conducted to assess compliance with regulatory requirements.
- Issues identification and management: identification, timely escalation and management of compliance related issues.
- Communication and reporting: timely, accurate and complete reporting to key stakeholders, senior management and the Board of Directors.

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 the major driver of our risk profile 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 the businesses. 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 of Directors. 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.

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 that an activity undertaken by an organization or its representatives will impair its image in the community or lower public confidence in it, resulting in the loss of business, legal action or increased regulatory oversight.

Reputation risk can arise from a number of events and primarily occurs in connection with credit risk, regulatory, legal and operational risks and failure to maintain strong risk conduct. Operational failures and non-compliance with laws and regulations can have a significant reputational impact on us.

We have put in place a Reputation Risk Framework which provides an overview of our approach to the management of this risk. It focuses on our organizational responsibilities, and controls in place to mitigate reputation risks.

The following principles guide our management of reputation risk:

- We must operate with integrity at all times in order to sustain a strong and positive reputation.
- Protecting our reputation is the responsibility of all our employees, including senior management, and extends to the Board of Directors.

Legal and regulatory environment risk

Certain regulatory reforms will impact the way in which we operate, both in Canada and abroad, and the full impact of some of these reforms 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 regulatory reforms have potential to increase our operational, compliance, and technology costs and adversely affect our profitability.

Canadian Housing Market and Consumer Debt

The Government of Canada (GoC) continues to express concerns with the level and sustainability of Canadian household debt, driven in part by higher levels of mortgage debt as a result of persistent and unprecedented low interest rates and continued elevation of house prices in the Vancouver and Toronto markets. The Office of the Superintendent of Financial Institutions (OSFI) has introduced a number of measures to address these concerns. These include updates to the regulatory capital requirements for loans secured by residential real estate, effective November 1, 2016, and proposals issued on September 23, 2016 to change the regulatory framework for mortgage insurers to better align capital requirements to market conditions and more accurately reflect underlying risks. In addition, on July 7, 2016, OSFI released a letter to all federally regulated financial institutions (FRFIs) outlining the regulator's expectation for the internal controls and risk management practices of mortgage lenders and insurers to be sound and take into account changing market developments.

The GoC has also been studying the Canadian housing market, particularly in areas such as affordability, supply and demand, and long-term sustainability, and, on October 3, 2016, announced additional measures. These include: (i) standardizing the eligibility criteria for high- and low-ratio insured mortgages (effective November 30, 2016); (ii) introducing a mortgage rate stress test for all insured mortgages (effective October 17, 2016); (iii) modifying eligibility for the capital gains tax exemption on the sale of a principal residence by non-residents and certain trusts; and (iv) expanding the authority of the Canada Revenue Agency to improve compliance and administration of the tax system with respect to the disposition of real estate. In addition, the GoC announced it will be holding further public consultations on whether lender-risk sharing for government-backed insured mortgages could enhance the current system.

Credit Cards and Interchange Fees

On September 14, 2016, the GoC announced its intention to further assess the fees charged by credit card networks in order to ensure adequate competition and transparency for Canadian businesses and consumers when it comes to the fees they incur when using credit cards. At the same time, the GoC indicated it will review the effects of the November 2014 voluntary fee reductions undertaken by Visa and MasterCard‡.

Supervision of Foreign Banking Organizations (FBO)

On February 18, 2014, the U.S. Federal Reserve (Fed) finalized a new oversight regime for non-U.S. banks with subsidiaries, affiliates and branches operating in the U.S. The Enhanced Prudential Standards applies to all Bank Holding Companies and FBOs and is intended to address the perceived systemic risk that large foreign banks could pose to U.S. financial markets.

As an FBO with more than US$50 billion in U.S. non-branch assets, we were required to establish a separately capitalized U.S. Intermediate Holding Company (IHC), into which all of our U.S. legal entities must be placed and for which certain U.S.-based requirements apply. The IHC is subject to Fed oversight comparable to U.S. bank holding companies. On November 2, 2015, our existing U.S. holding company, RBC USA Holdco Corporation, became a U.S. bank holding company, subjecting it to certain U.S.-based requirements as a result of our acquisition of City National Bank Corporation, a U.S. insured depository institution. As of July 1, 2016, our required non-branch and non-agency U.S. assets were transferred into our U.S. holding company in order to establish the requisite IHC as it applies to RBC as an FBO.

On March 4, 2016, the Fed re-proposed a rule to limit the credit exposures of large banking organizations, including FBOs and IHCs, to any single counterparty or group of related counterparties. We expect we will need to modify our existing systems and put in place appropriate monitoring and reporting mechanisms in order to comply with the prescribed limits by the implementation deadline that will be established once the final rule is issued. If the rule is adopted as proposed, compliance will be required to be met daily, with monthly reporting to the Fed evidencing compliance.

We continue to enhance our existing risk management oversight and governance framework and practices in order to provide the governance and infrastructure needed to implement and support the remaining FBO-related requirements over the next several years, including those that relate to U.S. stress test and capital planning requirements.

Canadian Bail-in Regime

Bail-in regimes are being implemented in a number of jurisdictions in an effort to limit taxpayer exposure to potential losses of a failing institution and ensure the institution's shareholders and creditors remain responsible for bearing such losses. On April 20, 2016, the GoC introduced legislation to create a bank recapitalization or "bail-in" regime for the six domestic systemically important banks (D-SIBs). On June 22, 2016, legislation came into force, amending the *Bank Act*, the *Canada Deposit Insurance Corporation Act* and certain other federal statutes pertaining to banks to create such a regime for D-SIBs.

Under the regime, if OSFI is of the opinion that a D-SIB has ceased or is about to cease to be viable and its viability cannot be restored through the exercise of the Superintendent's powers, the GoC can direct the Canada Deposit Insurance Corporation to convert certain shares and liabilities of the bank into common shares of the bank or its affiliates. The shares and liabilities that will be subject to conversion, as well as the terms and conditions of conversion, will be prescribed by regulations to be made at a future date. The legislation also provides that OSFI will require such designated D-SIBs to maintain a minimum capacity to absorb losses, also known as total loss-absorbing capital (TLAC).

While the specific parameters around conversion and loss-absorbency are not yet known, these changes are not expected to have a material impact on our cost of long-term unsecured funding.

Total Loss-Absorbing Capacity (TLAC)

On November 9, 2015, the Financial Stability Board (FSB) finalized minimum common international standards related to TLAC of global systemically important banks (G-SIBs). The standards are intended to address the sufficiency of G-SIBs' capital to absorb losses in a resolution situation in a manner that minimizes impact on financial stability and ensures continuity of critical and long-term debt functions. Under the final standards, G-SIBs would be expected to meet a 16% Risk-Weighted Asset (RWA) requirement by 2019, increasing to 18% by 2022. In addition, G-SIBs would be expected by 2019 to maintain a TLAC leverage ratio exposure of 6% of the Basel III leverage ratio denominator, increasing to 6.75% by 2022. We would become subject to these enhanced requirements if we are designated as a G-SIB by the FSB in the future. To date, neither RBC nor any other Canadian bank has been designated as a G-SIB. It is also uncertain how these standards will be integrated into the Canadian bail-in regime described above.

On October 30, 2015, the Fed proposed rules establishing TLAC, long-term debt, and "clean holding company" requirements for U.S. G-SIBs and the IHCs of non-U.S. G-SIBs. We are not covered at this time by the proposal, but our U.S. IHC would become subject to these U.S. requirements should we be designated as a G-SIB in the future.

Global Over-the-Counter (OTC) Derivatives Reform

OTC derivatives reform continues on a global basis, with G20 governments transforming the capital regimes, regulatory frameworks and infrastructures in which market participants operate. On September 1, 2016, we began to exchange margin on bilateral OTC derivatives in accordance with U.S. regulatory guidelines and expect to become subject to Canadian rules on March 1, 2017. We will also be subject to EU and other jurisdictions' margin rules once deadlines are finalized. Global margin rules represent a fundamental change in how non-centrally cleared OTC derivatives are traded and require specific documents to be in place with all in-scope counterparties.

To avoid duplicative regulatory requirements and to mitigate banks' regulatory costs, the Commodity Futures Trading Commission (CFTC) has issued substituted compliance relief to us and other Canadian banks who are registered as non-U.S. swap dealers. Such relief allows us to comply with Canadian rules in areas deemed comparable by the CFTC. We, along with other Canadian banks, continues to engage with the CFTC to ensure ongoing availability of no-action relief and substituted compliance determinations in connection with these U.S. rules.

OTC derivatives reform in the EU is implemented through the European Market Infrastructure Regulation (EMIR) and the review of Markets in Financial Instruments Directive and accompanying Regulation (together, MiFID II/MiFIR). EU regulations will introduce requirements that certain products be traded on a new trading venue category, subject to a determination of sufficient liquidity by the European Securities and Markets Authority (ESMA), for certain OTC derivatives that ESMA has deemed to be subject to the clearing obligation under EMIR. The EU also announced it would delay implementation of MiFID II/MiFIR until January 2018.

Uniform Fiduciary Standards

On April 6, 2016, the U.S. Department of Labor issued a final rule establishing a uniform fiduciary standard for providers of investment advice and related services in connection with U.S. retirement plans and holders of individual retirement accounts, effective April 10, 2017. As reported previously, the rule will impose new requirements and costs on our U.S. Wealth Management brokers and investment advisors who currently provide individualized investment advice according to a "suitability" standard rather than a fiduciary interest standard.

On April 28, 2016, the Canadian Securities Administrators proposed their own version of a regulatory "best interest standard" intended to replace the current requirement for registered advisors, dealers and representatives to deal "fairly, honestly, and in good faith" with their clients. Similar standards have been proposed or finalized in other jurisdictions, including the U.K. and Australia.

While these impacts are not expected to materially affect our overall results, the U.S. rules could significantly impact our U.S. Wealth Management business. We are considering ways to minimize these impacts, including through changes to our current business structure and product offerings.

Regulatory Capital and Related Requirements

We continue to monitor and prepare for developments related to regulatory capital. The BCBS has issued a number of proposed revisions and new measures on a consultative basis that would reform the manner in which banks calculate, measure, and report regulatory capital and related risks, including with respect to the use of banks' own internal risk models. The impact of these proposals on us will depend on the final standards adopted by the BCBS and how these standards are implemented by our regulators. The BCBS expects these proposals to have a relatively modest impact on capital and leverage for most banks upon finalization. For further details on regulatory capital and related requirements, refer to the Capital Management section.

U.K. and European regulatory reform

In March 2016, certain RBC entities became subject to the U.K. Senior Managers Regime, which places a statutory duty on certain employees to take reasonable steps to prevent regulatory breaches in their areas of responsibility. A certification regime also applied to employees performing 'significant harm' roles. New conduct rules will also apply to in-scope employees from March 2017.

The Market Abuse Regulation became effective July 2016 and brought changes to the civil regime for market abuse in the EU, establishing rules relating to investment recommendations, market soundings, insider lists, and monitoring of suspicious transactions and orders.

Various articles within the Securities Financing Transactions Regulation took effect in 2016, including conditions around the re-use of collateral provided in the form of securities by EU counterparties.

The Packaged Retail and Insurance-based Investment Products (PRIIPs) Regulation, effective December 2016, requires prescribed disclosure documents to be provided to retail investors before they purchase PRIIPs. We will be responsible for creating and updating these documents for products which are manufactured by us, and for providing the relevant documents to clients who purchase PRIIPs from us, whether manufactured by us or by third parties.

MiFID II/MiFIR becomes effective January 2018 and will have 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.

Following the result of the June 2016 referendum, the U.K. is planning to exit the EU. A formal notice of the U.K. Government's intention to withdraw from the EU must be provided to European Council, triggering a two-year negotiation period during which the terms of the U.K.'s exit will be determined. Until those negotiations are concluded or the negotiation period expires, the U.K. will remain an EU Member State, subject to all EU legislation.

Competitive risk

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, relative 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. For example, our payments business is facing intense competition from emerging non-traditional competitors. This competition could also reduce net interest income, fee revenue and adversely affect our results.

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 or other risks for us.

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 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 funding and operational risks on us, under adverse economic conditions. Our enterprise-wide stress testing program uses stress scenarios featuring a range of severities based on 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.

Business and economic conditions

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 high 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. impacting Canada 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. 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 an increase in interest rates would benefit our businesses that are currently impacted by spread compression, 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 and 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. For further details on

economic and market factors which may impact our financial performance, refer to the Wealth Management, Investor & Treasury Services and Capital Markets sections.

Government fiscal, monetary and other policies
Our businesses and earnings are affected by the fiscal, monetary or other policies that are adopted by the Bank of Canada and various other Canadian regulatory authorities, the Fed in the U.S. and other U.S. government authorities, as well as those adopted by international regulatory authorities and agencies in jurisdictions in which we operate. 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 RBC 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 tax 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 CAO & 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 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.

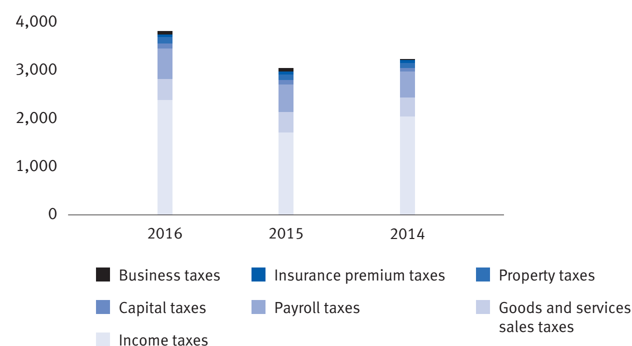
With respect to assessing the needs of our clients, we consider a number of factors including the purposes of the transaction. We seek to ensure that we only support bona fide client transactions with a business purpose and economic substance. Should we become aware of client transactions that are aimed at evading their tax obligations, we will not proceed with the transaction.

We operate in 38 countries worldwide. Our activities in these countries are subject to both Canadian and international tax legislation and other regulation, 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.

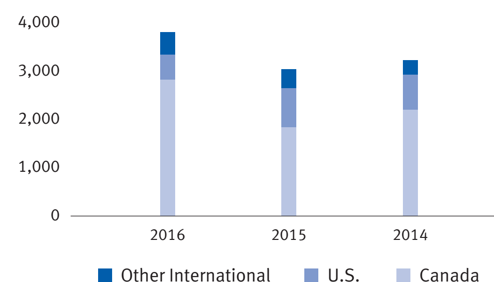
Given that we operate globally, complex tax legislation and accounting principles has resulted in differing legal interpretations between the respective tax authorities we deal with and ourselves, and we are at risk of tax authorities disagreeing with prior positions we have taken for tax purposes. When 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 2016, total income and other tax expense to various levels of governments globally totalled $3.8 billion (2015 – $3.1 billion; 2014 – $3.2 billion). In Canada, total income and other tax expense for the year ended October 31, 2016 to various levels of government totalled $2.8 billion (2015 – $1.9 billion; 2014 – $2.2 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 risk
Environmental risk is the risk of loss to financial, operational or reputational value resulting from the impact of environmental issues. It arises from the business activities and operations of both us and our clients. Environmental issues that lead to environmental risk are broad and may include: air emissions, wastewater discharge, waste management, site contamination, environmental regulation, climate change and community and social impacts. Group Risk Management (GRM) is responsible for establishing policy requirements for the identification, assessment, control, monitoring and reporting of environmental risk, and for ensuring the policies are reviewed and updated periodically. The environmental risk associated with our clients and their operations is evaluated in order to establish the due diligence requirements for transactions. Business segments and corporate functions are responsible for incorporating environmental risk management requirements and controls within their operations.

We are a signatory to the Equator Principles and applies its credit risk management framework to determine, assess and manage environmental and social risks in project finance transactions. RBC Global Asset Management is a signatory to the UN Principles for Responsible Investment. Our approach to responsible investment integrates environmental, social and governance (ESG) issues into the investment process when doing so may have a material impact on our investment risk or return. Through the Carbon Disclosure Project we regularly publish corporate disclosure on risks associated with climate change and the management of greenhouse gas emissions from our own operations. We will continue to investigate and assess climate change risks related to the physical effects of changing climate, transitioning to a low-carbon economy, and regulatory requirements, and appropriate future climate-related financial disclosures. RBC Corporate Citizenship sets corporate environmental strategy and reports annually on environmental management in the Corporate Responsibility Report and Public Accountability Statements.

Property insurance businesses can be affected due to changing climate patterns and an increase in the number and cost of claims associated with severe storms and other natural disasters. On July 1, 2016, we completed the sale of RBC General Insurance Company to Aviva Canada Inc., which involved the sale of our home and auto insurance manufacturing business. RBC Insurance had already exited the Property Reinsurance market in 2006. As a result of these transactions, RBC Insurance does not have any exposure to losses related to property and auto insurance.

Other factors

Other factors that may affect actual 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

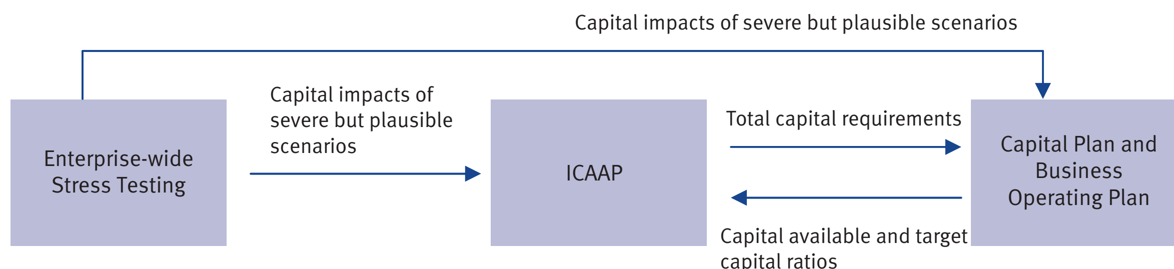
We actively manage our capital to maintain strong capital ratios and high ratings while providing strong returns to our shareholders. In addition to the regulatory requirements, we consider the expectations of credit rating agencies, depositors and shareholders, as well as our business plans, stress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

Capital management framework

Our capital management framework provides the policies and processes for defining, measuring, raising and investing all types of capital in a co-ordinated and consistent manner. It includes our overall approach to capital management, including guiding principles as well as roles and responsibilities relating to capital adequacy and transactions, dividends, solo capital and management of risk-weighted assets (RWA) and leverage ratio exposures. We manage and monitor capital from several perspectives, including regulatory capital, economic capital and subsidiary capital.

Our capital planning is a dynamic process which 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. The integral parts of our capital planning are comprised of our business operating plans, enterprise-wide stress testing and Internal Capital Adequacy Assessment Process (ICAAP), along with the considerations of regulatory capital requirements 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, projected market and economic environment and peer positioning. This includes incorporating potential capital transactions based on our projected internal capital generation, business forecasts, market conditions and other developments, such as accounting and regulatory changes that may impact capital requirements. All of the components in the capital plan are monitored throughout the year and are revised as deemed appropriate.



Our Enterprise-wide stress testing and ICAAP provide key inputs for capital planning, including setting the appropriate 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 exceptional adverse events. ICAAP is an OSFI mandated annual process to assess capital adequacy and requirements to cover all material risks, with a cushion to cover severe but plausible contingencies. In accordance with the OSFI guideline, the major components of our ICAAP process include comprehensive risk assessment, stress testing, capital assessment and planning (both economic and regulatory capital), 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 conservation buffer and D-SIBs surcharge, 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 the OSFI regulatory targets to maintain capital strength for forthcoming regulatory and accounting changes, peer comparatives, rating agencies sensitivities and solo capital level.

The Board of Directors is responsible for 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 established 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 regulatory capital requirements are determined by guidelines issued by OSFI, which are based on the minimum Basel III capital ratios proposed by the Basel Committee on Banking Supervision (BCBS). Our capital requirements are determined at a consolidated level.

The BCBS sets out the Basel III transitional requirements for Common Equity Tier 1 capital (CET1), Tier 1 capital and Total capital ratios at 5.125%, 6.625% and 8.625%, respectively for 2016, which would be required to be fully phased-in ("all-in") to 7.0%, 8.5% and 10.5%, respectively, by January 1, 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 January 1, 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 domestic systemic important bank (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 that a bank may consider. Under the option selected by RBC, the CVA capital charge for CET1, Tier 1 capital and Total capital was 64%, 71%, and 77%, respectively, for 2016. In 2017, the CVA capital charge will be 72%, 77% and 81%, respectively, and will reach 100% for each tier of capital by 2019.

Under Basel III, banks select from two main approaches, the Standardized Approach or the Internal Ratings Based (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 capital, we received approval from OSFI on May 10, 2016 for the use of the Advance Measurement Approach (AMA) for operational risk capital measurement subject to the application of a Standardized Approach floor. We commenced reflecting operational risk capital under the AMA in the third quarter of 2016.

In October 2014, OSFI issued its "Leverage Requirements (LR) Guideline", which replaced the OSFI Assets-to-Capital Multiple (ACM) with the Basel III Leverage ratio, beginning in the first quarter of 2015. The leverage ratio is defined as Tier 1 capital divided by leverage ratio exposure. The leverage ratio exposure is the sum of (a) on-balance sheet exposures; (b) derivative exposures; (c) securities financing transaction exposures and (d) off-balance sheet items. Canadian banks are expected to maintain a leverage ratio that meets or exceeds 3% at all times.

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. We were not designated as a G-SIB as of November 2016. However, as we met the BCBS size threshold, we disclosed the 12 indicators using the OSFI prescribed template for the financial years ended 2014 and 2015 in our Q2 2016 Report to Shareholders.

In January 2016, BCBS issued the revised minimum capital requirements for market risk, with an effective date no later than December 2019. The purpose of the revised market risk framework is to ensure that the standardized and internal model approaches to market risk deliver credible capital outcomes and promote consistent implementation of the standards across jurisdictions.

In March 2016, the BCBS released a consultation paper entitled, *"Pillar 3 disclosure requirements – consolidated and enhanced framework"*. The proposed disclosure enhancements include the addition of a dashboard of key metrics and the disclosure of a risk-weighted asset benchmark determined only by the application of Basel standardized approaches, referred to as the hypothetical risk-weighted asset disclosure. In addition, the proposal also includes enhanced granularity for disclosure of prudent valuation adjustments and incorporates additions to the Pillar 3 framework to reflect ongoing reforms to the regulatory framework, such as the total loss-absorbing capacity regime for G-SIBs, the proposed operational risk framework, and the final standard for market risk. The BCBS's proposal would also consolidate all existing Pillar 3 disclosure requirements of the Basel framework, including the leverage and liquidity ratios disclosure templates. Together with the BCBS Revised Pillar 3 disclosure requirements issued in January 2015, the proposed disclosure requirements included in this consultation paper would comprise the single Pillar 3 framework. OSFI originally required D-SIBs to implement the Basel Pillar 3 disclosure requirement by October 31, 2017, however, in August 2016, the implementation date was extended to October 31, 2018. OSFI's final Pillar 3 guideline is expected to be issued in 2017.

In July 2016, BCBS issued an updated version of the Basel III Document – Revisions to the securization framework, incorporating simple, transparent, and comparable securitization requirements. The revisions set out revised methodologies for the calculation of regulatory capital requirements for securitization exposures held by banks in the banking book in order to address certain shortcomings identified by the Basel Committee under the current Basel II securitization framework. It is expected to become effective in January 2018.

We continue to monitor and prepare for developments related to regulatory capital and leverage. The BCBS has issued a number of proposed revisions and new measures on a consultative basis that would reform the manner in which banks calculate, measure, and report regulatory capital and related risks, including with respect to the use of banks' own internal risk models. The BCBS is currently reviewing feedback and commentary on these revisions and will likely finalize these proposals in early 2017. The BCBS has indicated it does not expect these proposals to significantly increase capital and leverage for most banks upon finalization.

The following table provides a summary of OSFI regulatory target ratios under Basel III:

Basel III – OSFI regulatory target — Table 71

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, 2016	Meet or exceed OSFI regulatory target ratios
	Minimum	Capital Conservation Buffer	Minimum including Capital Conservation Buffer	D-SIB Surcharge (1)	Minimum including Capital Conservation Buffer and D-SIB surcharge (1)		
Common Equity Tier 1	› 4.5%	2.5%	› 7.0%	1.0%	› 8.0%	10.8%	✓
Tier 1 capital	› 6.0%	2.5%	› 8.5%	1.0%	› 9.5%	12.3%	✓
Total capital	› 8.0%	2.5%	› 10.5%	1.0%	› 11.5%	14.4%	✓
Leverage ratio	› 3.0%	n.a.	› 3.0%	n.a.	› 3.0%	4.4%	✓

(1) Effective January 1, 2016, the D-SIBs surcharge is applicable to risk-weighted capital.
n.a. not applicable

Regulatory capital, RWA and capital ratios

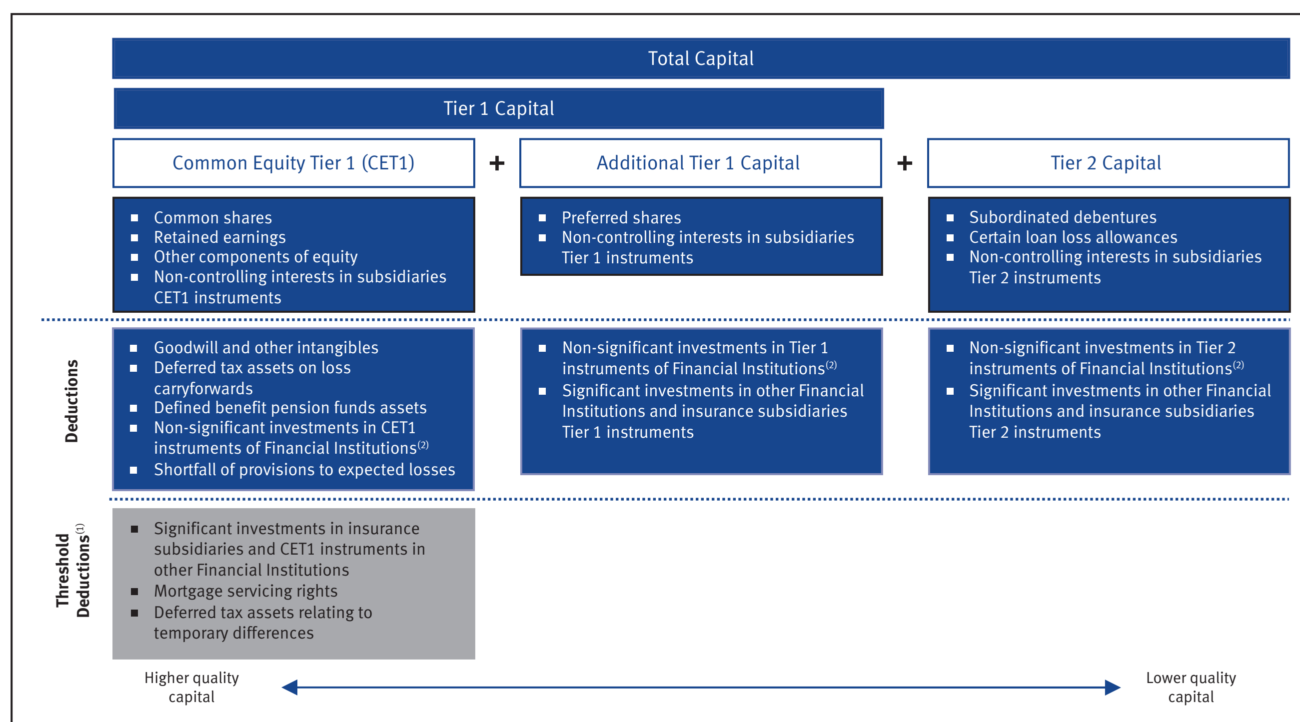
Under Basel III, regulatory capital consists of CET1, Additional Tier 1 and Tier 2 capital.

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 NVCC features to be included into regulatory capital. For further details on NVCC, refer to the discussion above.

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

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



(1) First level: The amount by which each of the items exceeds a 10% threshold of CET1 capital (after all deductions but before threshold deductions) will be deducted from CET1 capital. Second level: The aggregate amount of the three items not deducted from the first level above and in excess of 15% of CET1 capital after regulatory adjustments will be deducted from capital, and the remaining balance not deducted will be risk-weighted at 250%.
(2) Non-significant investments are subject to certain CAR criteria that drive the amount eligible for deduction.

The following tables provide details on our regulatory capital, RWA and capital ratios. Our capital position remained strong and our capital ratios remain well above OSFI regulatory targets:

Regulatory capital, risk-weighted assets (RWA) and capital ratios **Table 72**

	As at	
(Millions of Canadian dollars, except percentage and multiple amounts and as otherwise noted)	**October 31 2016**	October 31 2015
Capital (1)		
CET1 capital	**$ 48,181**	$ 43,715
Tier 1 capital	**55,270**	50,541
Total capital	**64,950**	58,004
Risk-weighted Assets (RWA) used in calculation of capital ratios (1), (2)		
CET1 capital RWA	**447,436**	411,756
Tier 1 capital RWA	**448,662**	412,941
Total capital RWA	**449,712**	413,957
Total capital RWA consisting of: (1)		
Credit risk	**$ 369,751**	$ 323,870
Market risk	**23,964**	39,786
Operational risk	**55,997**	50,301
Total capital RWA	**$ 449,712**	$ 413,957
Capital ratios and Leverage ratio (1), (3)		
CET1 ratio	**10.8%**	10.6%
Tier 1 capital ratio	**12.3%**	12.2%
Total capital ratio	**14.4%**	14.0%
Leverage ratio	**4.4%**	4.3%
Leverage ratio exposure (billions)	**$ 1,265.1**	$ 1,170.2

(1) Capital, RWA, and capital ratios are calculated using OSFI Capital Adequacy Requirements based on the Basel III framework. Leverage ratios are calculated using OSFI Leverage Requirements Guideline based on the Basel III framework.

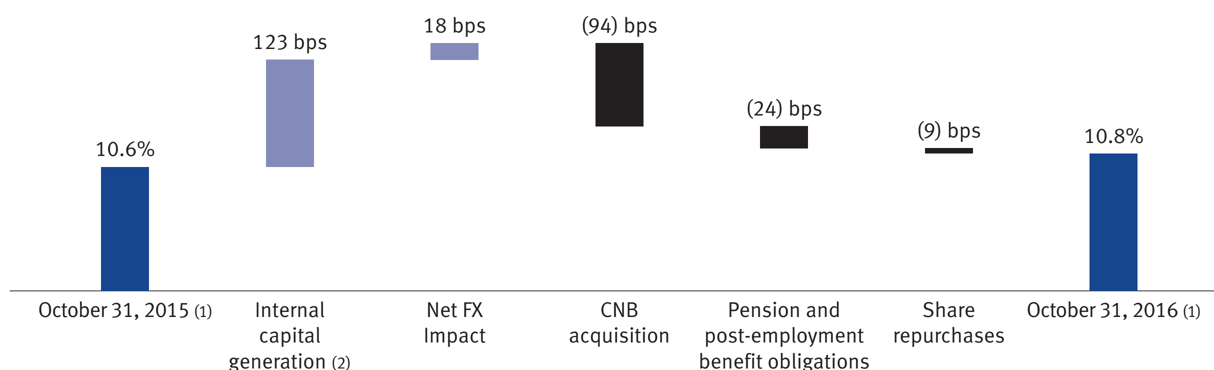
(2) In 2015 and 2016, the CVA scalars of 64%, 71% and 77% were applied to CET1, Tier 1 and Total Capital, respectively. In fiscal 2017, the scalars will be 72%, 77% and 81%, respectively.

(3) To enhance comparability among other global financial institutions, our transitional CET1, Tier 1, Total capital and leverage ratios as at October 31, 2016 were 11.8%, 12.3%, 14.4%, and 4.5%, respectively. Transitional is defined as capital calculated according to the current year's phase-in of regulatory adjustments and phase-out of non-qualifying capital instruments.

Regulatory Capital		Table 73
	All-in basis	
(Millions of Canadian dollars)	2016	2015
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	$ 18,161	$ 14,739
Retained earnings	41,217	37,645
Accumulated other comprehensive income (and other reserves)	4,926	4,626
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	(16,136)	(13,308)
Common Equity Tier 1 capital (CET1)	$ 48,181	$ 43,715
Additional Tier 1 capital: instruments and regulatory adjustments		
Directly issued qualifying Additional Tier 1 instruments plus related stock surplus	3,825	2,350
Directly issued capital instruments to phase out from Additional Tier 1	3,261	4,473
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)	7,089	6,826
Tier 1 capital (T1 = CET1 + AT1)	$ 55,270	$ 50,541
Tier 2 capital: instruments and provisions and regulatory adjustments		
Directly issued qualifying Tier 2 instruments plus related stock surplus	6,630	3,073
Directly issued capital instruments subject to phase out from Tier 2	2,738	4,227
Tier 2 instruments issued by subsidiaries and held by third parties (amount allowed in group Tier 2)	18	29
Collective allowance	294	134
Regulatory adjustments applied to Tier 2 under Basel III	–	–
Tier 2 capital (T2)	$ 9,680	$ 7,463
Total capital (TC = T1 + T2)	$ 64,950	$ 58,004

2016 vs. 2015

Continuity of CET1 ratio (Basel III)



(1) Represents rounded figures.
(2) Internal capital generation includes $5.1 billion which represents Net income available to shareholders, less common and preferred shares dividends and excludes $235 million relating to the gain on the sale of RBC General Insurance Company to Aviva Canada Inc.

Our CET1 ratio was 10.8%, up 20 bps from last year, mainly reflecting internal capital generation and the impact of foreign exchange translation. These factors were partially offset by the acquisition of City National, the impact of lower discount rates in determining our pension and other post-employment benefit obligations, and share repurchases.

Our Tier 1 capital ratio of 12.3% was up 10 bps, mainly due to the factors noted above under the CET1 ratio and the net issuance of additional Tier 1 capital instruments.

Our Total capital ratio of 14.4% was up 40 bps, mainly due to the factors noted above under the Tier 1 capital ratio and the net issuance of subordinated debentures.

Our Leverage ratio was up 10 bps, mainly due to internal capital generation, partially offset by the acquisition of City National and higher leverage ratio exposures reflecting business growth, primarily in loans.

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, OSFI requires the minimum risk-based capital to be no less than 90% of the capital requirements as calculated under the Basel I standards. If the capital requirement is less than 90%, a transitional adjustment to RWA must be applied as prescribed by OSFI CAR guidelines.

Total capital risk-weighted assets **Table 74**

	2016						2015
			Risk-weighted assets				
As at October 31 (Millions of Canadian dollars, except percentage amounts)	Exposure (1)	Average of risk weights (2)	Standardized approach	Advanced approach	Other	Total	Total
Credit risk							
Lending-related and other							
Residential mortgages	$ 232,398	7%	$ 6,546	$ 10,818	$ –	$ 17,364	$ 12,797
Other retail	230,376	23%	5,632	46,532	–	52,164	51,157
Business	319,208	58%	42,933	143,352	–	186,285	151,565
Sovereign	103,218	9%	2,929	6,847	–	9,776	9,175
Bank	123,799	10%	2,161	9,640	–	11,801	7,695
Total lending-related and other	$ 1,008,999	27%	$ 60,201	$ 217,189	$ –	$ 277,390	$ 232,389
Trading-related							
Repo-style transactions	$ 396,013	2%	$ 69	$ 7,780	$ 75	$ 7,924	$ 6,680
Derivatives – including CVA – CET1 phase-in adjustment	96,565	31%	815	17,197	11,784	29,796	29,332
Total trading-related	$ 492,578	8%	$ 884	$ 24,977	$ 11,859	$ 37,720	$ 36,012
Total lending-related and other and trading-related	$ 1,501,577	21%	$ 61,085	$ 242,166	$ 11,859	$ 315,110	$ 268,401
Bank book equities	2,442	97%	–	2,362	–	2,362	2,045
Securitization exposures	59,933	16%	2,891	6,700	–	9,591	7,363
Regulatory scaling factor	n.a.	n.a.	n.a.	15,028	–	15,028	14,400
Other assets	45,259	56%	n.a.	n.a.	25,384	25,384	29,460
Total credit risk	$ 1,609,211	23%	$ 63,976	$ 266,256	$ 37,243	$ 367,475	$ 321,669
Market risk							
Interest rate			$ 1,835	$ 2,649	$ –	$ 4,484	$ 8,174
Equity			1,518	1,487	–	3,005	3,731
Foreign exchange			875	56	–	931	988
Commodities			313	13	–	326	956
Specific risk			3,824	1,906	–	5,730	11,800
Incremental risk charge			–	9,488	–	9,488	14,137
Total market risk			$ 8,365	$ 15,599	$ –	$ 23,964	$ 39,786
Operational risk			$ 3,891	52,106	n.a.	$ 55,997	$ 50,301
CET1 capital risk-weighted assets (3)	$ 1,609,211		$ 76,232	333,961	37,243	$ 447,436	$ 411,756
Additional CVA adjustment, prescribed by OSFI, for Tier 1 capital					1,226	1,226	1,185
Tier 1 capital risk-weighted assets (3)	$ 1,609,211		$ 76,232	333,961	38,469	$ 448,662	$ 412,941
Additional CVA adjustment, prescribed by OSFI, for Total capital					1,050	1,050	1,016
Total capital risk-weighted assets (3)	$ 1,609,211		$ 76,232	$ 333,961	$ 39,519	$ 449,712	$ 413,957

(1) Total exposure represents exposure at default which is the expected gross exposure upon the default of an obligor. This amount is before any allowance against impaired loans or partial write-offs and does not reflect the impact of credit risk mitigation and collateral held.
(2) Represents the average of counterparty risk weights within a particular category.
(3) In fiscal 2015 and 2016, the CVA scalars of 64%, 71% and 77%, were applied to CET1, Tier 1 and Total Capital, respectively. In 2017, the scalars will be 72%, 77% and 81%, respectively.
n.a. not applicable

2016 vs. 2015

During the year, CET1 RWA was up $36 billion, primarily as a result of the acquisition of City National and higher RWA (excluding the impact of foreign exchange translation), mainly in loans, partially offset by the impact of foreign exchange translation.

Selected capital management activity

The following table provides our selected capital management activity for the year ended October 31, 2016.

Selected capital management activity			Table 75
	2016		
(Millions of Canadian dollars, except number of shares)	Issuance or redemption date	Number of shares (000s)	Amount
Tier 1 capital			
Common shares issued			
Issued in connection with share-based compensation plans (1)		4,981	$ 307
Issued in connection with the acquisition of City National	November 2, 2015	41,619	3,115
Purchased for cancellation (2)		(4,629)	(56)
Issuance of preferred shares Series BK (3), (4)	December 16, 2015	29,000	725
Issuance of preferred shares Series BM (3), (4)	March 7, 2016	30,000	750
Redemption of RBC Trust Capital Securities – Series 2015 (3)	December 31, 2015		(1,200)
Tier 2 capital			
Issuance of January 20, 2026 subordinated debentures (3), (4)	January 20, 2016		1,500
Issuance of January 27, 2026 subordinated debentures (3), (4)	January 27, 2016		2,106
Redemption of November 2, 2020 subordinated debentures (3)	November 2, 2015		(1,500)
Other			
Issuance of preferred shares Series C-1 (3), (5)	November 2, 2015	175	227
Issuance of preferred shares Series C-2 (3), (5)	November 2, 2015	100	153
Purchase for cancellation of preferred shares Series C-1 (3), (5)	February 24, 2016	(93)	(120)
Purchase for cancellation of preferred shares Series C-2 (3), (5)	February 24, 2016	(80)	(122)

(1) Amounts include cash received for stock options exercised during the period and the fair value adjustments to stock options.
(2) Based on book value.
(3) For further details, refer to Notes 19 and 21 of our audited 2016 Annual Consolidated Financial Statements.
(4) Non-Viable Contingent Capital (NVCC) capital instruments.
(5) Based on fair value.

On May 30, 2016, we announced our normal course issuer bid (NCIB), which commenced on June 1, 2016 and continues until May 31, 2017. In 2016, we repurchased approximately 4.6 million of our common shares. The total cost of the shares repurchased was $362 million, comprised of a book value of $56 million, with an additional $306 million premium paid on repurchase.

Dividends

Our common share dividend policy reflects our earnings outlook, payout ratio objective and the need to maintain adequate levels of capital to fund business opportunities. In 2016, our dividend payout ratio was 48%, which met our dividend payout ratio target of 40% to 50%. Common share dividends paid during the year were $4.8 billion.

Selected share data (1) **Table 76**

(Millions of Canadian dollars, except number of shares and as otherwise noted)	2016			2015			2014		
	Number of shares (000s)	**Amount**	**Dividends declared per share**	Number of shares (000s)	Amount	Dividends declared per share	Number of shares (000s)	Amount	Dividends declared per share
Common shares outstanding	**1,485,394**	**$ 17,939**	**$ 3.24**	1,443,423	$ 14,573	$ 3.08	1,442,233	$ 14,511	$ 2.84
First preferred shares outstanding									
Non-cumulative Series W (2)	**12,000**	**300**	**1.23**	12,000	300	1.23	12,000	300	1.23
Non-cumulative Series AA	**12,000**	**300**	**1.11**	12,000	300	1.11	12,000	300	1.11
Non-cumulative Series AB	**12,000**	**300**	**1.18**	12,000	300	1.18	12,000	300	1.18
Non-cumulative Series AC	**8,000**	**200**	**1.15**	8,000	200	1.15	8,000	200	1.15
Non-cumulative Series AD	**10,000**	**250**	**1.13**	10,000	250	1.13	10,000	250	1.13
Non-cumulative Series AE	**10,000**	**250**	**1.13**	10,000	250	1.13	10,000	250	1.13
Non-cumulative Series AF	**8,000**	**200**	**1.11**	8,000	200	1.11	8,000	200	1.11
Non-cumulative Series AG	**10,000**	**250**	**1.13**	10,000	250	1.13	10,000	250	1.13
Non-cumulative Series AJ (3)	**13,579**	**339**	**0.88**	13,579	339	0.88	13,579	339	0.97
Non-cumulative Series AK (3)	**2,421**	**61**	**0.60**	2,421	61	0.67	2,421	61	0.53
Non-cumulative Series AL (3)	**12,000**	**300**	**1.07**	12,000	300	1.07	12,000	300	1.15
Non-cumulative Series AN (3)	**–**	**–**	**–**	–	–	–	–	–	0.39
Non-cumulative Series AP (3)	**–**	**–**	**–**	–	–	–	–	–	0.39
Non-cumulative Series AR (3)	**–**	**–**	**–**	–	–	–	–	–	0.39
Non-cumulative Series AT (3)	**–**	**–**	**–**	–	–	–	–	–	1.17
Non-cumulative Series AV (3)	**–**	**–**	**–**	–	–	–	–	–	1.17
Non-cumulative Series AX (3)	**–**	**–**	**–**	–	–	–	13,000	325	1.53
Non-cumulative Series AZ (3), (4)	**20,000**	**500**	**1.00**	20,000	500	1.00	20,000	500	0.50
Non-cumulative Series BB (3), (4)	**20,000**	**500**	**0.98**	20,000	500	0.98	20,000	500	0.46
Non-cumulative Series BD (3), (4)	**24,000**	**600**	**0.90**	24,000	600	0.73	–	–	–
Non-cumulative Series BF (3), (4)	**12,000**	**300**	**0.90**	12,000	300	0.63	–	–	–
Non-cumulative Series BH (4)	**6,000**	**150**	**1.23**	6,000	150	0.58	–	–	–
Non-cumulative Series BI (4)	**6,000**	**150**	**1.23**	6,000	150	0.42	–	–	–
Non-cumulative Series BJ (4)	**6,000**	**150**	**1.51**	6,000	150	–	–	–	–
Non-cumulative Series BK (3), (4)	**29,000**	**725**	**1.29**	–	–	–	–	–	–
Non-cumulative Series BM (3), (4)	**30,000**	**750**	**0.98**	–	–	–	–	–	–
Non-cumulative Series C-1 (5)	**82**	**107**	**US$55.00**	–	–	–	–	–	–
Non-cumulative Series C-2 (5)	**20**	**31**	**US$67.50**	–	–	–	–	–	–
Treasury shares held – preferred	**31**	**–**		(63)	(2)		1	–	
Treasury shares held – common	**(1,159)**	**(80)**		532	38		892	71	
Stock options									
Outstanding (6)	**11,388**			8,182			8,579		
Exercisable	**6,909**			5,231			4,987		
Dividends									
Common		**4,817**			4,443			4,097	
Preferred		**294**			191			213	

(1) For further details about our capital management activity, refer to Note 21 of our audited 2016 Annual Consolidated Financial Statements.
(2) Effective February 24, 2010, we have the right to convert into common shares at our option, subject to certain restrictions.
(3) Dividend rate will reset every five years.
(4) NVCC capital instruments.
(5) 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.
(6) Effective Q1 2016, includes share-based compensation awards from our acquisition of City National.

As at November 25, 2016, the number of outstanding common shares and stock options and awards was 1,485,641,741 and 11,136,292, respectively, and the number of Treasury shares – preferred and Treasury shares – common was (30,253) and (369,236), respectively.

NVCC provisions require the conversion of the capital instrument into a variable number of common shares in the event that OSFI deems the Bank to be non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. If a NVCC trigger event were to occur, our NVCC capital instruments 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 2,762 million RBC common shares, on aggregate, which would represent a dilution impact of 65% based on the number of RBC common shares outstanding as at October 31, 2016.

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 77**

(Millions of Canadian dollars)	2016	2015
Credit risk	$ 20,550	$ 16,400
Market risk (trading and non-trading)	3,200	3,900
Operational risk	4,900	4,600
Business and fixed asset risk	3,100	2,900
Insurance risk	650	550
Goodwill and other intangibles	16,100	11,900
Regulatory capital allocation	8,900	5,400
Attributed capital	$ 57,400	$ 45,650
Unattributed capital	4,800	6,650
Average common equity	$ 62,200	$ 52,300

2016 vs. 2015

Attributed capital increased $12 billion largely due to higher Credit and Goodwill and other intangibles risks, reflecting the acquisition of City National, business growth, and the impact of foreign exchange translation. Higher regulatory capital allocation, reflecting a higher capital attribution rate, also contributed to the increase.

The increase in Operational and Business and fixed asset risks reflects higher revenue.

Market risk decreased largely due to changes in risk treatment of certain portfolios and reduced inventories in fixed income and securitized product portfolios.

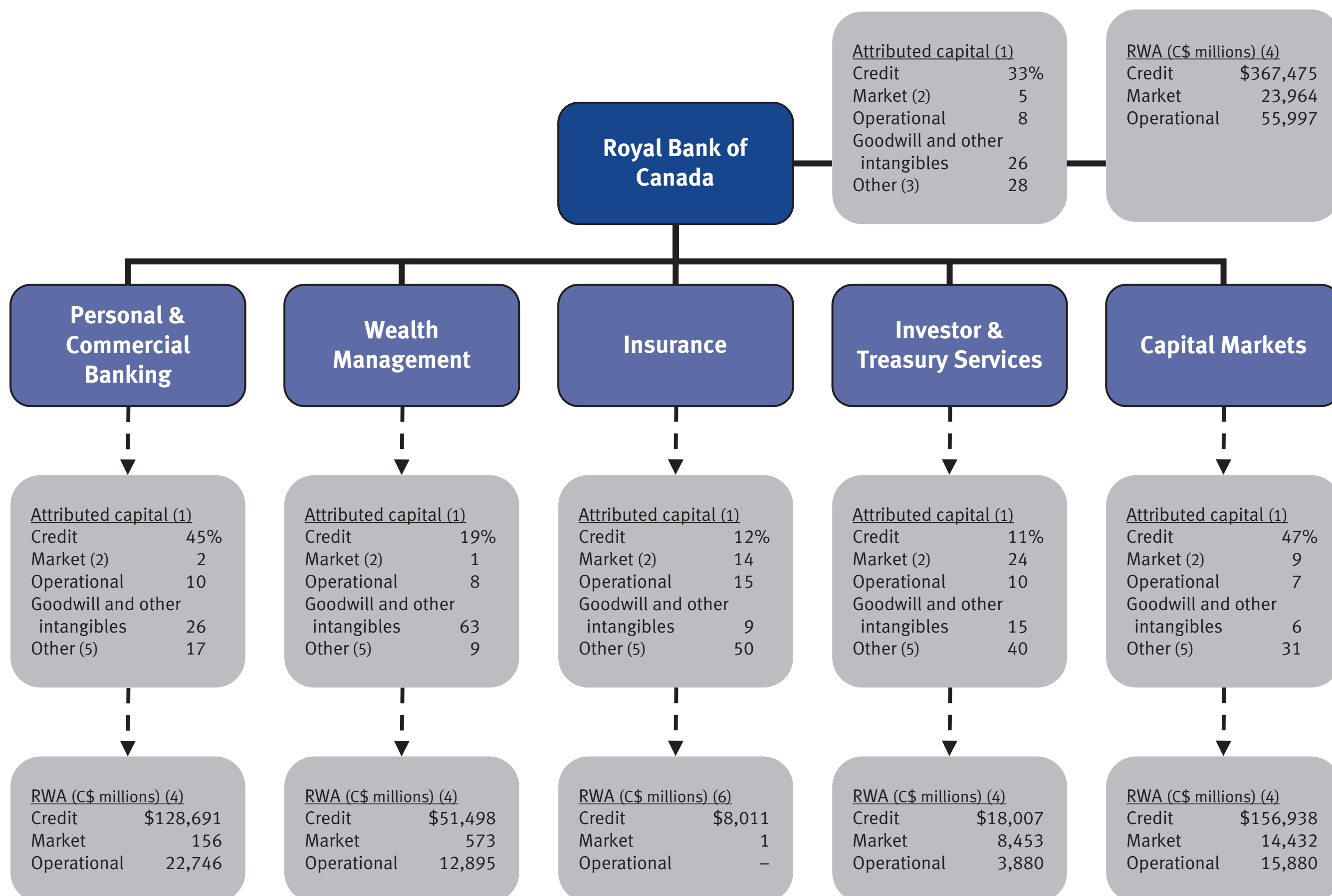
We remain well capitalized with current levels of available capital exceeding the attributed capital required to underpin all of our material risks.

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, business financial services and cards businesses. 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 level of capital that is necessary to support our various business, 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 above represents 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 our subsidiaries' capital. We invest capital across the enterprise to meet any local regulators' capital adequacy requirements and maximize returns to our shareholders. We invest in our subsidiaries as appropriate during the year. 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 its compliance with any 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 has responsibility 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.

Additional financial information

Exposure to U.S. subprime and Alt-A through RMBS, CDOs and mortgages

Certain activities and transactions we enter into expose us to the risk of default of U.S. subprime and Alt-A residential mortgages. Our exposures to U.S. subprime and Alt-A residential mortgages of $71 million represented less than 0.1% of our total assets as at October 31, 2016, compared to $423 million or less than 0.1% last year. The decrease of $352 million was primarily due to the sale of certain securities.

Commercial mortgage-backed securities

The fair value of our total direct holdings of Canadian and U.S. commercial mortgage-backed securities was $355 million as at October 31, 2016.

Assets and liabilities measured at fair value

Our financial instruments carried at fair value are classified as Level 1, 2 or 3, in accordance with the fair value hierarchy set out in International Financial Reporting Standards (IFRS) 13, *Fair Value Measurement*. For further details on the fair value of our financial instruments and transfers between levels of the fair value hierarchy, refer to Note 3 of our audited 2016 Annual Consolidated Financial Statements.

The following table presents the total fair value of each major class of financial assets and financial liabilities measured at fair value and the percentage of the fair value of each class categorized as Level 1, 2 or 3:

Assets and liabilities measured at fair value — **Table 78**

	As at October 31, 2016				
(Millions of Canadian dollars, except percentage amounts)	Fair value	Level 1	Level 2	Level 3	Total
Financial assets					
Securities at FVTPL	$ 151,292	40%	60%	–%	100%
Available-for-sale	69,833	6	90	4	100
Assets purchased under reverse repurchase agreements and securities borrowed	121,692	–	100	–	100
Loans	2,412	–	86	14	100
Derivatives (1)	216,086	1	99	–	100
Financial liabilities					
Deposits	$ 98,856	–%	100%	–%	100%
Obligations related to securities sold short	50,369	65	35	–	100
Obligations related to assets sold under repurchase agreements and securities loaned	88,863	–	100	–	100
Derivatives (1)	212,781	1	98	1	100

(1) The derivative assets and liabilities presented in the table above do not reflect the impact of netting.

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 to our audited 2016 Annual Consolidated Financial Statements. Certain of these policies, as well as estimates made by management in applying such policies, are recognized as critical because they require us to make particularly subjective or complex judgments about matters that are inherently uncertain and because of the likelihood that significantly different amounts could be reported under different conditions or using different assumptions. Our critical accounting judgments, estimates and assumptions relate to the fair value of financial instruments, allowance for credit losses, goodwill and other intangible assets, employee benefits, consolidation, derecognition of financial assets, securities impairment, application of the effective interest method, provisions, insurance claims and policy benefit liabilities, and income taxes. Our critical accounting policies and estimates have been reviewed and approved by our Audit Committee, in consultation with management, as part of their review and approval of our significant accounting policies, judgments, estimates and assumptions.

Fair value of financial instruments and securities impairment

The fair value of a financial instrument is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. We determine fair value by incorporating all factors that market participants would consider in setting a price, including commonly accepted valuation approaches.

The Board of Directors provides oversight on valuation of financial instruments, primarily through the Audit Committee and Risk Committee. The Audit Committee reviews the presentation and disclosure of financial instruments that are measured at fair value, while the Risk Committee assesses adequacy of governance structures and control processes for valuation of these instruments.

We have established policies, procedures and controls for valuation methodologies and techniques to ensure fair value is reasonably estimated. Major valuation processes and controls include, but are not limited to, profit and loss decomposition, independent price verification (IPV) and model validation standards. These control processes are managed by either Finance or GRM and are independent of the relevant

businesses and their trading functions. Profit and loss decomposition is a process to explain the fair value changes of certain positions and is performed daily for trading portfolios. All fair value instruments are subject to IPV, a process whereby trading function valuations are verified against external market prices and other relevant market data. Market data sources include traded prices, brokers and price vendors. We give priority to those third-party pricing services and prices having the highest and most consistent accuracy. The level of accuracy is determined over time by comparing third-party price values to traders' or system values, to other pricing service values and, when available, to actual trade data. 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 model use. Valuation models are approved for use within our model risk management framework. The framework addresses, among other things, model development standards, validation processes and procedures, and approval authorities. Model validation ensures that a model is suitable for its intended use and sets parameters for its use. All models are revalidated regularly by qualified personnel who are independent of the model design and development. Annually our model risk profile is reported to the Board of Directors.

In determining fair value, a hierarchy is used which prioritizes the inputs to valuation techniques. The fair value hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). Determination of fair value based on this hierarchy requires the use of observable market data whenever available. Level 1 inputs are unadjusted quoted prices in active markets for identical assets or liabilities that we have the ability to access at the measurement date. Level 2 inputs include quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and model inputs that are either observable, or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Level 3 inputs are one or more inputs that are unobservable and significant to the fair value of the asset or liability. Unobservable inputs are used to measure fair value to the extent that observable inputs are not available at the measurement date. The availability of inputs for valuation may affect the selection of valuation techniques. The classification of a financial instrument in the hierarchy for disclosure purposes is based upon the lowest level of input that is significant to the measurement of fair value.

Where observable prices or inputs are not available, management judgment is required to determine fair values by assessing other relevant sources of information such as historical data, proxy information from similar transactions, and through extrapolation and interpolation techniques. For more complex or illiquid instruments, significant judgment is required in the determination of the model used, the selection of model inputs, and in some cases the application of valuation adjustments to the model value or quoted price for inactively traded financial instruments, as the selection of model inputs may be subjective and the inputs may be unobservable. Unobservable inputs are inherently uncertain as there is little or no market data available from which to determine the level at which the transaction would occur under normal business circumstances. Appropriate parameter uncertainty and market risk valuation adjustments for such inputs and other model risk valuation adjustments are assessed in all such instances.

We record valuation adjustments to appropriately reflect counterparty credit quality of our derivative portfolio, differences between the overnight index swap (OIS) curve and London Interbank Offered Rates (LIBOR) for collateralized derivatives, funding valuation adjustments (FVA) for uncollateralized and under-collateralized OTC derivatives, unrealized gains or losses at inception of the transaction, bid-offer spreads, unobservable parameters and model limitations. These adjustments may be subjective as they require significant judgment in the input selection, such as probability of default and recovery rate, and are intended to arrive at 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 is previously estimated using management judgment, and may therefore impact unrealized gains and losses recognized in Non-interest income – Trading revenue or Other.

Valuation adjustments are recorded for the credit risk of our derivative portfolios in order to arrive at their fair values. CVA takes into account our counterparties' creditworthiness, the current and potential future mark-to-market of the transactions, and the effects of credit mitigants such as master netting and collateral agreements. CVA amounts are derived from estimates of exposure at default, probability of default, recovery rates on a counterparty basis, and market and credit factor correlations. Exposure at default is the amount of expected derivative related assets and liabilities at the time of default, estimated through modelling using underlying risk factors. Probability of default and recovery rate are generally implied from the market prices for credit protection and credit ratings of the counterparty. Correlation is the statistical measure of how credit and market factors may move in relation to one another. Correlation is estimated using historical data and market data where available. CVA is calculated daily and changes are recorded in Non-interest income – Trading revenue.

In the determination of fair value of collateralized OTC derivatives using the OIS curve, our valuation approach accounts for the difference between certain OIS rates and LIBOR for derivatives valuation as valuation adjustments.

FVA are also calculated to incorporate cost and benefit of funding in the valuation of uncollateralized and under-collateralized OTC derivatives. Future expected cash flows of these derivatives are discounted to reflect the cost and benefit of funding the derivatives by using a funding curve, implied volatilities and correlations as inputs.

Where required, a valuation adjustment is made to reflect the unrealized gain or loss at inception of a financial instrument contract where the fair value of that financial instrument is not obtained from a quoted market price or cannot be evidenced by other observable market transactions based on a valuation technique incorporating observable market data.

A bid-offer valuation adjustment is required when a financial instrument is valued at the mid-market price, instead of the bid or offer price for asset or liability positions, respectively. The valuation adjustment takes into account the spread from the mid to either the bid or offer price.

Some valuation models require parameter calibration from such factors as market observed option prices. The calibration of parameters may be sensitive to factors such as the choice of instruments or optimization methodology. A valuation adjustment is also estimated to mitigate the uncertainties of parameter calibration and model limitations.

We classify our financial instruments measured at fair value on a recurring basis into three levels based on the transparency of the inputs used to measure the fair values of the instruments. As at October 31, 2016, Level 2 instruments, whose fair values are based on observable inputs, include $505 billion of financial assets (October 31, 2015 – $456 billion) and $413 billion of financial liabilities (October 31, 2015 – $394 billion). These amounts represent 87% of our total financial assets at fair value (October 31, 2015 – 85%) and 92% of our total financial liabilities at fair value (October 31, 2015 – 91%), respectively. Level 3 instruments, whose valuations include significant unobservable inputs, include $4 billion of financial assets (October 31, 2015 – $6 billion) and $2 billion of financial liabilities (October 31, 2015 – $2 billion), representing 1% of our total financial assets at fair value (October 31, 2015 – 1%) and 0.4% of our total financial liabilities at fair value (October 31, 2015 – 1%), respectively.

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. 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. For U.S. non-agency MBS,

recovery rates are largely dependent upon forecasted property prices which were assessed at the municipal level, provided by a third-party vendor. In addition, we also consider the transaction structure and credit enhancement for the structured securities. If the result indicates 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. In assessing whether there is any objective evidence that suggests that the security is impaired we consider factors which include the length of time and extent the fair value has been below the cost and the financial condition and near term prospects of the issuer. We also consider the estimated recoverable value and the period of recovery. We conduct further analysis for securities where the fair value had been below cost for greater than twelve months. If an AFS security is impaired, the cumulative unrealized losses previously recognized in Other components of equity are recognized directly in income under Non-interest income. As at October 31, 2016, our gross unrealized losses on AFS securities were $254 million (October 31, 2015 – $304 million). Refer to Note 4 to our audited 2016 Annual Consolidated Financial Statements for more information.

Allowance for credit losses
We maintain 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 management considers appropriate to cover credit related losses incurred as at the balance sheet date.

Allowances are determined individually for loans that are individually significant, and collectively for loans that are not individually significant and loans which are significant but for which there is no objective evidence of impairment, using current and historical credit information in both quantitative and qualitative assessments. For further information on allowance for credit losses, refer to Note 5 to our audited 2016 Annual Consolidated Financial Statements.

Individually assessed loans
Loans which are individually significant are assessed individually for objective indicators of impairment. A loan is considered impaired when management determines that it will not be able to collect all amounts due according to the original contractual terms or the equivalent value.

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 amount 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.

Collectively assessed loans
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 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, in portfolios of similar credit risk characteristics, 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 and 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 the contractual cash flows of the loans in the group and historical loss experience for loans with credit risk characteristics similar to those in the group. Historical loss experience is adjusted based on current observable data to reflect the effects of current conditions that did not affect the period on which the historical loss experience is based and to remove the effects of conditions in the historical period that do not currently exist. The methodology and assumptions used for estimating future cash flows are reviewed regularly to reduce any differences between loss estimates and actual loss experience.

Write-off of loans
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 credit cards, the balances and related allowance for credit losses are written off when payment is 180 days in arrears. Personal loans are generally written off at 150 days past due.

Total allowance for credit losses
Based on the procedures discussed above, management believes that the total allowance for credit losses of $2,326 million is adequate to absorb estimated credit losses incurred in the lending portfolio as at October 31, 2016 (October 31, 2015 – $2,120 million). This amount includes $91 million (October 31, 2015 – $91 million) classified in Provisions under Other liabilities on our Consolidated Balance Sheets, which relates to off-balance sheet and other items.

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. A CGU's recoverable amount is the higher of its fair value less cost of disposal and its value in use. The carrying amount of a CGU comprises the carrying amount of assets, liabilities, and goodwill allocated to the CGU. When the carrying value of a CGU exceeds its recoverable amount, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the CGU and then to the other assets of the CGU proportionally based on the carrying amount of each asset. Any impairment charge is recognized in income in the period it is identified. Subsequent reversals of goodwill impairment are prohibited.

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.

Other intangible assets with a finite life are amortized on a straight-line basis over their estimated useful lives as follows: computer software – 3 to 10 years and customer relationships – 10 to 20 years. They are assessed for indicators of impairment at each reporting period if there is an indication that an asset may be impaired. An impairment test is performed by comparing the carrying amount of the intangible asset to its recoverable amount. Where it is not possible to estimate the recoverable amount of an individual asset, we estimate the recoverable amount of the CGU to which the asset belongs. If the recoverable amount of the asset (or CGU) is less than its carrying amount, the carrying amount of the intangible asset is written down to its recoverable amount as an impairment loss. An impairment loss recognized previously is reversed if there is a change in the estimates used to determine the recoverable amount of the asset (or CGU) since the last impairment loss was recognized. If an impairment loss is subsequently reversed, the carrying amount of the asset (or CGU) is revised to the lower of its recoverable amount and the carrying amount that would have been determined (net of amortization) had there been no prior impairment.

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.

As at October 31, 2016, we had $11.2 billion of goodwill (October 31, 2015 – $9.3 billion) and $4.6 billion of other intangible assets (October 31, 2015 – $2.8 billion). For further details, refer to Notes 2 and 10 to our 2016 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. The discount rate assumption is determined using spot rates from a derived AA corporate bond yield curve for our Canadian pension and other post-employment benefit plans, and spot rates from an AA corporate bond yield curve for our International pension and other post-employment benefit plans. All other assumptions are determined by management and are reviewed by the actuaries. Actual experience that differs from the actuarial assumptions will affect the amounts of benefit obligations and remeasurements that we recognize. The weighted average assumptions used and the sensitivity of key assumptions are presented in Note 17 to our audited 2016 Annual Consolidated Financial Statements.

Consolidation

Subsidiaries are those entities, including structured entities, over which we have control. We control an entity when we are exposed, or have rights, to variable returns from our involvement with the entity and have the ability to affect those returns through our power over the investee. We have power over an entity when we have existing rights that give us the current ability to direct the activities that most significantly affect the entity's returns (relevant activities). Power may be determined on the basis of voting rights or, in the case of structured entities, other contractual arrangements.

We are not deemed to control an entity when we exercise power over an entity in an agency capacity. In determining whether we are acting as an agent, we consider the overall relationship between us, the investee and other parties to the arrangement with respect to the following factors: (i) the scope of our decision making power; (ii) the rights held by other parties; (iii) the remuneration to which we are entitled; and (iv) our exposure to variability of returns.

The determination of control is based on the current facts and circumstances and is continuously assessed. In some circumstances, different factors and conditions may indicate that various parties control an entity depending on whether those factors and conditions are assessed in isolation or in totality. Significant judgment is applied in assessing the relevant factors and conditions in totality when determining whether we control an entity. Specifically, judgment is applied in assessing whether we have substantive decision making rights over the relevant activities and whether we are exercising our power as a principal or an agent.

We consolidate all subsidiaries from the date 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.

Non-controlling interests in subsidiaries that we consolidate are shown on our Consolidated Balance Sheets as a separate component of equity which is distinct from our shareholders' equity. The net income attributable to non-controlling interests is separately disclosed in our Consolidated Statements of Income.

For further details, refer to the Off-balance sheet arrangements section and Note 7 to our audited 2016 Annual Consolidated Financial Statements.

Derecognition of financial assets

We periodically enter into transactions in which we transfer financial assets such as loans or packaged MBS to structured entities or trusts that issue securities to investors. We derecognized 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 these 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. As at October 31, 2016, the carrying and fair values of the transferred assets that do not qualify for derecognition were $137 billion and $137 billion, respectively (October 31, 2015 – $119 billion and $119 billion, respectively), and the carrying and fair values of the associated liabilities totalled $137 billion and $138 billion, respectively (October 31, 2015 – $119 billion and $120 billion, respectively). For further information on derecognition of financial assets, refer to Note 6 to our audited 2016 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 for all interest bearing financial instruments using the effective interest method. The effective interest rate is the rate that discounts estimated future cash flows over the

expected life of the financial asset or liability to the net carrying amount upon initial recognition. Significant judgment is applied in determining the effective interest rate due to uncertainty in the timing and amounts of future cash flows.

Provisions
Provisions are liabilities of uncertain timing or amount and are recognized when we have a present legal or constructive obligation as a result of a past event, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Provisions are measured as the best estimate of the consideration required to settle the present obligation at the reporting date. Significant judgment is required in determining whether a present obligation exists and in estimating the probability, timing and amount of any outflows. We record provisions related to litigation, asset retirement obligations, and the allowance for off-balance sheet and other items. Provisions are recorded under Other liabilities on our Consolidated Balance Sheets.

We are required to estimate the results of ongoing legal proceedings, expenses to be incurred to dispose of capital assets, and credit losses on undrawn commitments and guarantees. 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 15 to our audited 2016 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 the interpretation of the relevant tax laws and in the estimation of the provision for current and deferred income taxes, including the expected timing and amount of the realization. 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 24 to our audited 2016 Annual Consolidated Financial Statements for further information.

Changes in accounting policies and disclosure

As a result of the acquisition of City National, we updated our accounting policies in the first quarter to reflect policies on Acquired Loans, Acquired Credit-Impaired Loans and Federal Deposit Insurance Corporation Covered Loans. Refer to Note 2 of our audited 2016 Annual Consolidated Financial Statements for details of these changes.

Future changes in accounting policy and disclosure

IFRS 15 *Revenue from Contracts with Customers* (IFRS 15)
In May 2014, the International Accounting Standards Board (IASB) issued IFRS 15 which establishes 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. In April 2016, the IASB issued amendments to IFRS 15, which clarify the underlying principles of IFRS 15 and provide additional transitional relief on initial application. IFRS 15 and its amendments will be effective for us on November 1, 2018.

IFRS 9 *Financial Instruments* (IFRS 9)
In July 2014, the IASB issued the complete version of IFRS 9, which brings together the classification and measurement, impairment and hedge accounting phases of the IASB's project to replace IAS 39 *Financial Instruments: Recognition and Measurement* (IAS 39).

In January 2015, OSFI issued an advisory with respect to the early adoption of IFRS 9 for D-SIBs, requiring D-SIBs to adopt IFRS 9 for the annual period beginning on November 1, 2017. As a result, we will be required to adopt IFRS 9 on November 1, 2017, with the exception of the own credit provisions of IFRS 9, which we adopted in the second quarter of 2014.

On June 21, 2016, OSFI issued its final guideline on *IFRS 9 Financial Instruments and Disclosures*. The guideline provides guidance to Federally Regulated Entities on the application of IFRS 9, including the implementation of the expected credit loss framework under IFRS 9. The guideline is consistent with the BCBS *Guidance on credit risk and accounting for expected credit losses*, issued on December 18, 2015, which sets out supervisory expectations on sound credit risk practices associated with the implementation of expected credit loss accounting models. The OSFI guideline will be effective for us on November 1, 2017, consistent with the adoption of IFRS 9.

Classification and measurement
IFRS 9 introduces a principles-based approach to the classification of financial assets. Debt instruments, including hybrid contracts, are measured at FVTPL, fair value through other comprehensive income (FVOCI) or amortized cost based on an entity's business model and the nature of the cash flows of the assets. These categories replace the existing IAS 39 classifications of AFS, loans and receivables, and held-to-maturity. Equity instruments are measured at FVTPL, unless they are not held for trading purposes, in which case an election can be made on initial recognition to measure them at FVOCI with no subsequent reclassification to profit or loss.

The combined application of the contractual cash flow characteristics and business model tests as at November 1, 2017 are expected to result in some differences in the classification of financial assets when compared to our classification under IAS 39. We do not expect significant changes to the classification of most financial assets on our balance sheet; however we have identified certain assets currently held at amortized cost and AFS that may be reclassified to FVTPL under IFRS 9.

For financial liabilities, IFRS 9 includes the pre-existing requirements for classification and measurement previously included in IAS 39.

Impairment
IFRS 9 introduces an expected credit loss impairment model that differs significantly from the incurred loss model under IAS 39 and is expected to result in earlier recognition of credit losses.

Scope
Under IFRS 9, the same impairment model is applied to all financial assets, except for financial assets classified or designated as at FVTPL and equity securities designated as at FVOCI, which are not subject to impairment assessment. The scope of the IFRS 9 expected credit loss impairment model includes amortized cost financial assets, debt securities classified as at FVOCI, and off balance sheet loan commitments and financial guarantees which were previously provided for under IAS 37 *Provisions, Contingent Liabilities and Contingent Assets* (IAS 37). The above-mentioned reclassifications into or out of these categories under IFRS 9 and items that previously fell under the IAS 37 framework will be considered in determining the scope of our application of the new expected credit loss impairment model.

Expected credit loss impairment model
Under IFRS 9, credit loss allowances will be measured on each reporting date according to a three-stage expected credit loss impairment model:

- 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 next 12 months.
- 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.
- Stage 3 – When a financial asset is considered to be credit-impaired, a loss allowance equal to full lifetime expected credit losses will be recognized. Interest revenue is calculated based on the carrying amount of the asset, net of the loss allowance, rather than on its gross carrying amount.

Stage 1 and Stage 2 credit loss allowances effectively replace the collectively-assessed allowance for incurred but not identified losses recorded under IAS 39, while Stage 3 credit loss allowances effectively replace the individually and collectively assessed allowances for impaired loans. Under IFRS 9, the population of financial assets and corresponding allowances disclosed as Stage 3 will not necessarily correspond to the amounts of financial assets currently disclosed as impaired in accordance with IAS 39. Consistent with IAS 39, loans are written off when there is no realistic probability of recovery. Accordingly, our policy on when financial assets are written off is not expected to significantly change on adoption of IFRS 9.

Because all financial assets within the scope of the IFRS 9 impairment model will be assessed for at least 12-months of expected credit losses, and the population of financial assets to which full lifetime expected credit losses applies is larger than the population of impaired loans for which there is objective evidence of impairment in accordance with IAS 39, the total allowance for credit losses is expected to increase under IFRS 9 relative to the allowance for credit losses under IAS 39.

Changes in the required credit loss allowance, including the impact of movements between Stage 1 (12 month expected credit losses) and Stage 2 (lifetime expected credit losses), will be recorded in profit or loss. Because of the impact of moving between 12 month and lifetime expected credit losses and the application of forward looking information, provisions are expected to be more volatile under IFRS 9 than IAS 39.

Measurement
The measurement of expected credit losses will primarily be based on the product of the instrument's PD, LGD, and EAD, discounted to the reporting date. The main difference between Stage 1 and Stage 2 expected credit losses is the respective PD horizon. Stage 1 estimates will use a maximum of a 12-month PD parameter while Stage 2 estimates will use a lifetime PD parameter. Stage 3 estimates will continue to leverage existing processes for estimating losses on impaired loans, but will consider the lifetime expected loss estimate produced by the Stage 2 models.

An expected credit loss estimate will be produced for each individual exposure, including amounts which are subject to a more simplified model for estimating expected credit losses; however the relevant parameters will be modeled on a collective basis using the same underlying data pool supporting our stress testing and regulatory capital expected loss processes. Models have been developed, primarily leveraging our existing models for enterprise-wide stress testing, which will be validated and tested during 2017.

For the small percentage of our portfolios that lack detailed historical information and/or loss experience, we will apply simplified measurement approaches that may differ from what is described above. These approaches will be designed to maximize the available information that is reliable and supportable for each portfolio and may be collective in nature.

Movement between stages
Movements between Stage 1 and Stage 2 are based on whether an instrument's credit risk as at the reporting date has increased significantly relative to the date it was initially recognized. For the purposes of this assessment, credit risk is based on an instrument's lifetime probability of default, not the losses we expect to incur. The assessment of significant increases in credit risk is a new concept under IFRS 9 and will require significant judgment.

Our assessment of significant increases in credit risk will be based on changes in lifetime PD. We have established preliminary thresholds for significant increases in credit risk which will be validated throughout 2017. Additional qualitative reviews of the staging criteria by business, finance and risk representatives will be performed to verify the positions identified as having significantly increased in risk and identify any additional positions whose credit risk has increased significantly. As a backstop, instruments that are 30 days past due will move to Stage 2 even if our other metrics do not indicate that a significant increase in credit risk has occurred.

Movements between Stage 2 and Stage 3 are based on whether financial assets are credit-impaired as at the reporting date. The determination of credit-impairment under IFRS 9 is expected to be similar to the individual assessment of financial assets for objective evidence of impairment under IAS 39.

The assessments for significant increases in credit risk since initial recognition and credit-impairment are performed independently as at each reporting period. Assets can move in both directions through the stages of the impairment model. After a financial asset has migrated to Stage 2, once it is no longer considered that credit risk has significantly increased relative to initial recognition as at a subsequent reporting period, it will move back to Stage 1. Similarly, an asset that is in Stage 3 will move back to Stage 2 when it is no longer considered to be credit-impaired.

Forward-looking information
The measurement of expected credit losses for each stage and the assessment of significant increases in credit risk must consider information about past events and current conditions as well as reasonable and supportable forecasts of future events and economic conditions. The estimation and application of forward-looking information will require significant judgment.

Our estimation of expected credit losses is expected to be a discounted probability-weighted estimate that considers multiple future macroeconomic scenarios. Scenarios will cover our base macroeconomic expectations as well as possible upside and downside conditions, and will be designed to capture the point of non-linearity of losses. Scenarios will be probability-weighted according to our best estimate of their relative likelihood based on historical frequency and current trends and conditions and macroeconomic factors such as gross domestic product and unemployment rates.

Our assessment of significant increases in credit risk will be based on changes in probability-weighted forward-looking lifetime PD, using the same macroeconomic scenarios as the calculation of expected credit losses.

Definition of default
The definition of default used in the measurement of expected credit losses and the assessment for movement between stages is expected to be consistent with the definition of default used for internal credit risk management purposes. IFRS 9 does not define default, but contains a rebuttable presumption that default has occurred when an exposure is greater than 90 days past due. We are still assessing whether it is appropriate to rebut this presumption for any of our products.

Regulatory capital
Under the current Basel III regulatory capital framework, any shortfall of accounting allowances to expected losses calculated according to the Basel rules for IRB portfolios is a deduction from CET1 capital. If accounting allowances exceed Basel expected losses, the excess is included as Tier 2 capital.

After the adoption of IFRS 9, expected loss models will be 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 several key differences under current Basel rules which could lead to significantly different expected loss estimates:

- 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 several 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 several probability-weighted macroeconomic scenarios.

As at October 31, 2016, our shortfall of accounting allowances under IAS 39 to Basel expected losses was $1.4 billion. Based on the current regulatory rules, the regulatory capital impact of an increase in our accounting allowances under IFRS 9 relative to IAS 39 will be mitigated to the extent of our current deduction from CET1 capital.

Hedge accounting
The new hedge accounting model under IFRS 9 aims to simplify hedge accounting, align the accounting for hedge relationships more closely with an entity's risk management activities and permit hedge accounting to be applied more broadly to a greater variety of hedging instruments and risks eligible for hedge accounting.

The new standard does not explicitly address the accounting for macro hedging activities, which is being addressed by the IASB through a separate project. As a result, IFRS 9 includes an accounting policy choice to retain IAS 39 for hedge accounting requirements until the amended standard resulting from the IASB's project on macro hedge accounting is effective. We expect to elect the accounting policy choice to continue applying hedge accounting under the IAS 39 framework. The new hedge accounting disclosures required by the related amendments to IFRS 7 *Financial Instruments: Disclosures*, however, are required for the annual period beginning November 1, 2017.

Transition
The impairment and classification and measurement requirements of IFRS 9 will be applied retrospectively by adjusting our Consolidated Balance Sheet at November 1, 2017, the date of initial application of IFRS 9. There is no requirement to restate comparative periods other than for hedge accounting. At this stage, it is not possible to reliably quantify the potential financial effect to the Bank from the adoption of IFRS 9.

To manage our transition to IFRS 9, we have implemented a comprehensive enterprise-wide program led jointly by Finance and Risk Management that focuses on key areas of impact, including financial reporting, data, systems and processes, as well as communications and training. During fiscal 2015, we completed a detailed assessment of the scope and complexity of the adoption of IFRS 9 which identified areas with differences between IFRS 9 and IAS 39 and secured resources to complete the implementation. We continue to monitor and revisit our preliminary conclusions in order to identify any further financial, capital and business implications.

During fiscal 2016, we have continued to manage the IFRS 9 program through the completion of activities and deliverables to support the key areas of impact noted above. These include the following steps completed to date:

- Assessed the classification of financial assets based on our business model and the nature of the cash flows of the assets under review;
- Assessed the financial and economic impacts and identified process and systems requirements to ensure a successful transition;
- Continually evaluated our resourcing model, including cost analysis and timeline, to ensure that sufficient program resources are available to meet key deliverables;
- Agreed on many key accounting interpretations and formulated position papers on key issues;
- Completed design specifications for data sourcing, systems, models, controls and processes to ensure alignment between finance and risk processes and systems;
- Leveraged our stress testing and Basel expected loss processes to build new impairment models and parameters;
- Prepared dry-run expected credit loss estimates based on initial models and staging parameters;
- Designed key performance indicators to assist in assessing our dry-run and parallel run results;
- Initiated design of controls and governance over future processes, including key judgmental areas such as the forecasting and probability-weighting of future macroeconomic scenarios;
- Continued to roll out training and educational seminars to key stakeholders across the Bank in the various business platforms and functional groups; and
- Provided regular updates to the Audit Committee, Risk Committee and senior management to ensure escalation of key issues and risks.

In the upcoming year, steps we expect to complete include the following:

- Complete a parallel run, the results of which will be used to test our models and methodologies against our key performance indicators;
- Validate new impairment models through back-testing and other methods;
- Prepare for future system changes, including a tool to determine the appropriate classification of new assets, where appropriate;
- Complete documentation of updated bank-wide accounting and risk policies;
- Finalize governance and control frameworks over new processes and test internal controls;
- Document the roll-out and implementation of the IFRS 9 project and governance structure including key controls;
- Continue to provide training and educational seminars to impacted internal stakeholders; and
- Draft future external disclosures and transition adjustments.

As we prepare for our transition to IFRS 9, we continue to monitor industry interpretations of the new standard and expect to adjust our transition and implementation plans accordingly. Our IFRS 9 program remains aligned to our implementation schedule and we are on track to meet the timelines essential to our transition.

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.

IAS 7 *Statement of Cash Flows* (IAS 7)
In January 2016, the IASB issued amendments to IAS 7, which will require specific disclosures for movements in certain liabilities on the statement of cash flow. These amendments will be effective for us on November 1, 2017.

Regulatory developments

BCBS revised Pillar 3 disclosure requirements
On March 11, 2016, the BCBS released a consultation paper entitled, *"Pillar 3 disclosure requirements – consolidated and enhanced framework"*. The proposed enhancements include the addition of a "dashboard" of key metrics, a draft disclosure requirement of hypothetical risk-weighted assets calculated based on the Basel framework's standardized approaches. The proposal also includes enhanced granularity for disclosure of prudent valuation adjustments and incorporates additions to the Pillar 3 framework to reflect ongoing reforms to the regulatory framework such as the total loss-absorbing capacity regime for global systemically important banks, the proposed operational risk framework, and the final standard for market risk. The BCBS's proposal would also consolidate all existing Pillar 3 disclosure requirements of the Basel framework, including the leverage and liquidity ratios disclosure templates. Together with the Revised Pillar 3 disclosure requirements issued in January 2015, the proposed disclosure requirements included in this consultation paper would comprise the single Pillar 3 framework.

In January 2016, OSFI issued a draft guideline indicating that all domestic systemically important banks are expected to implement the Basel Pillar 3 disclosure requirements for the reporting period ending October 31, 2017. In August 2016, OSFI revised its expectation on the implementation date to the reporting period ending October 31, 2018. The final guideline is expected to be issued in 2017.

BCBS standards on interest rate risk in the banking book
On April 21, 2016, the BCBS issued new standards for Interest Rate Risk in the Banking Book (IRRBB), which enhances disclosure requirements to promote greater consistency, transparency, and compatibility in the measurement and management of IRRBB. This includes quantitative disclosure requirements based on common interest rate shock scenarios. These disclosure requirements will be effective for us in the reporting period ending October 31, 2018.

BCBS guidance on regulatory capital treatment of accounting provisions
On October 12, 2016, the BCBS released a consultative document and a discussion paper on the regulatory treatment of accounting provisions under the Basel III regulatory capital framework. The papers address the impact of new expected credit loss accounting standards, such as IFRS 9, that will replace the current incurred loss models used for accounting purposes. IFRS 9 will be effective for us on November 1, 2017. For further details on the adoption of IFRS 9, including application regulatory guidance, refer to the Critical accounting policies and estimates section.

The consultative document sets out the BCBS's proposal to retain, for an interim period, the current regulatory treatment of credit loss provisions under the standardized and the IRB approaches. The document also considers the adoption of transitional arrangements to phase-in the impact of the new expected credit loss accounting standards on regulatory capital. The discussion paper explores policy options for the long-term regulatory treatment of loss allowances under the new expected credit loss accounting standards. Both papers are open for public comment until January 13, 2017.

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 Administrative Officer and Chief Financial Officer, to allow timely decisions regarding required disclosure.

As of October 31, 2016, management evaluated, under the supervision of and with the participation of the President and Chief Executive Officer and the Chief Administrative Officer and Chief Financial Officer, the effectiveness of our disclosure controls and procedures as defined under rules adopted by the United States Securities and Exchange Commission. Based on that evaluation, the President and Chief Executive Officer and the Chief Administrative Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of October 31, 2016.

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, 2016 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Related party transactions

In the ordinary course of business, we provide normal banking services and operational services, and enter into other transactions with associated and other related corporations, including our joint venture entities, on terms similar to those offered to non-related parties. We grant loans to directors, officers and other employees at rates normally accorded to preferred clients. In addition, we offer deferred share and other plans to non-employee directors, executives and certain other key employees. For further information, refer to Notes 12 and 29 of our audited 2016 Annual Consolidated Financial Statements.

Net interest income on average assets and liabilities — Table 79

(Millions of Canadian dollars, except for percentage amounts)	Average balances 2016	2015	2014	Interest 2016	2015	2014	Average rate 2016	2015	2014
Assets									
Deposits with other banks (1)									
Canada	**$ 11,679**	$ 8,463	$ 1,692	**$ 114**	$ 70	$ 61	**0.98%**	0.83%	3.61%
U.S.	**16,842**	5,567	540	**71**	12	1	**0.42**	0.22	0.19
Other International	**15,415**	14,837	5,227	**(18)**	(5)	14	**(0.12)**	(0.03)	0.27
	43,936	28,867	7,459	**167**	77	76	**0.38%**	0.27%	1.02%
Securities									
Trading	**153,114**	164,509	149,920	**3,366**	3,543	3,322	**2.20**	2.15	2.22
Available-for-sale	**72,440**	52,833	43,047	**1,227**	976	671	**1.69**	1.85	1.56
	225,554	217,342	192,967	**4,593**	4,519	3,993	**2.04**	2.08	2.07
Asset purchased under reverse repurchase agreements and securities borrowed	**191,243**	165,602	136,857	**1,816**	1,251	971	**0.95**	0.76	0.71
Loans (2)									
Canada									
Retail (3)	**338,270**	326,153	314,159	**11,141**	11,842	11,996	**3.29**	3.63	3.82
Wholesale (3)	**69,028**	58,946	54,681	**3,249**	2,959	2,970	**4.71**	5.02	5.43
	407,298	385,099	368,840	**14,390**	14,801	14,966	**3.53**	3.84	4.06
U.S.	**75,734**	36,581	28,402	**2,038**	780	888	**2.69**	2.13	3.13
Other International	**29,409**	31,261	25,067	**1,448**	1,301	1,125	**4.92**	4.16	4.49
	512,441	452,941	422,309	**17,876**	16,882	16,979	**3.49**	3.73	4.02
Total interest-earning assets	**973,174**	864,752	759,592	**24,452**	22,729	22,019	**2.51**	2.63	2.90
Non-interest-bearing deposits with other banks	**17,586**	19,283	13,495	**–**	–	–	**–**	–	–
Customers' liability under acceptances	**13,247**	12,423	10,725	**–**	–	–	**–**	–	–
Other assets (1)	**172,393**	156,342	122,688	**–**	–	–	**–**	–	–
Total assets	**$ 1,176,400**	$ 1,052,800	$ 906,500	**$ 24,452**	$ 22,729	$ 22,019	**2.08%**	2.16%	2.43%
Liabilities and shareholders' equity									
Deposits (4)									
Canada	**487,194**	459,679	418,780	**4,714**	5,162	5,416	**0.97%**	1.12%	1.29%
U.S.	**83,001**	68,909	50,459	**413**	214	158	**0.50**	0.31	0.31
Other International	**67,365**	62,029	54,267	**340**	347	299	**0.50**	0.56	0.55
	637,560	590,617	523,506	**5,467**	5,723	5,873	**0.86**	0.97	1.12
Obligations related to securities sold short	**50,262**	56,827	50,548	**1,579**	1,645	1,494	**3.14**	2.89	2.96
Obligations related to assets sold under repurchase agreements and securities loaned	**110,231**	84,380	68,594	**629**	337	278	**0.57**	0.40	0.41
Subordinated debentures	**8,931**	7,654	6,632	**227**	240	246	**2.54**	3.14	3.71
Other interest-bearing liabilities (1)	**15,437**	13,585	251	**19**	13	12	**0.12**	0.10	4.78
Total interest-bearing liabilities	**822,421**	753,063	649,531	**7,921**	7,958	7,903	**0.96**	1.06	1.22
Non-interest-bearing deposits	**112,071**	76,830	69,596	**–**	–	–	**–**	–	–
Acceptances	**13,248**	12,422	10,725	**–**	–	–	**–**	–	–
Other liabilities (1)	**159,215**	151,845	124,643	**–**	–	–	**–**	–	–
Total liabilities	**$ 1,106,955**	$ 994,160	$ 854,495	**$ 7,921**	$ 7,958	$ 7,903	**0.72%**	0.80%	0.92%
Equity	**69,445**	58,640	52,005	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.
Total liabilities and shareholders' equity	**$ 1,176,400**	$ 1,052,800	$ 906,500	**$ 7,921**	$ 7,958	$ 7,903	**0.67%**	0.76%	0.87%
Net interest income and margin	**$ 1,176,400**	$ 1,052,800	$ 906,500	**$ 16,531**	$ 14,771	$ 14,116	**1.41%**	1.40%	1.56%
Net interest income and margin (average earning assets)									
Canada	**$ 572,671**	$ 539,333	$ 497,436	**$ 11,694**	$ 11,538	$ 11,121	**2.04%**	2.14%	2.24%
U.S.	**246,065**	165,083	135,876	**3,241**	1,977	1,896	**1.32**	1.20	1.40
Other International	**154,438**	160,336	126,280	**1,596**	1,256	1,099	**1.03**	0.78	0.87
Total	**$ 973,174**	$ 864,752	$ 759,592	**$ 16,531**	$ 14,771	$ 14,116	**1.70%**	1.71%	1.86%

(1) Starting in 2015, we have included cash collateral and margin deposits, and cash collateral received in Deposits with other banks and Other interest-bearing liabilities, respectively (previously, in Other assets and Other liabilities). Insurance segment assets and liabilities are included in Other assets and Other liabilities, respectively.
(2) Interest income includes loan fees of $573 million (2015 – $503 million; 2014 – $516 million).
(3) Amounts have been revised from those previously presented.
(4) Deposits include personal savings deposits with average balances of $166 billion (2015 – $142 billion; 2014 – $133 billion), interest expense of $.4 billion (2015 – $.6 billion; 2014 – $.7 billion) and average rates of .3% (2015 – .4%; 2014 – .5%). Deposits also include term deposits with average balances of $362 billion (2015 – $345 billion; 2014 – $302 billion), interest expense of $4.3 billion (2015 – $4.5 billion; 2014 – $4.4 billion) and average rates of 1.20% (2015 – 1.30%; 2014 – 1.47%).

Change in net interest income — Table 80

(Millions of Canadian dollars)	2016 (1) vs. 2015 Increase (decrease) due to changes in Average volume (2)	Average rate (2)	Net change	2015 vs. 2014 Increase (decrease) due to changes in Average volume (2)	Average rate (2)	Net change
Assets						
Deposits with other banks (3)						
Canada (4)	$ 27	$ 17	$ 44	$ 244	$ (235)	$ 9
U.S. (4)	24	35	59	9	2	11
Other international (4)	–	(13)	(13)	26	(45)	(19)
Securities						
Trading	(245)	68	(177)	323	(102)	221
Available-for-sale	362	(111)	251	153	152	305
Asset purchased under reverse repurchase agreements and securities borrowed	194	371	565	204	76	280
Loans						
Canada						
Retail (5)	440	(1,141)	(701)	458	(612)	(154)
Wholesale (5)	506	(216)	290	232	(243)	(11)
U.S.	835	423	1,258	256	(364)	(108)
Other international	(77)	224	147	278	(102)	176
Total interest income	$ 2,066	$ (343)	$ 1,723	$ 2,183	$ (1,473)	$ 710
Liabilities						
Deposits						
Canada	309	(757)	(448)	529	(783)	(254)
U.S.	44	155	199	58	(2)	56
Other international	30	(37)	(7)	43	5	48
Obligations related to securities sold short	(190)	124	(66)	186	(35)	151
Obligations related to assets sold under repurchase agreements and securities loaned	103	189	292	64	(5)	59
Subordinated debentures	40	(53)	(13)	38	(44)	(6)
Other interest-bearing liabilities (3)	2	4	6	637	(636)	1
Total interest expense	$ 338	$ (375)	$ (37)	$ 1,555	$ (1,500)	$ 55
Net interest income	$ 1,728	$ 32	$ 1,760	$ 628	$ 27	$ 655

(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) Starting in 2015, we have included cash collateral and margin deposits, and cash collateral received in Deposits with other banks and Other interest-bearing liabilities, respectively (previously, in Other assets and Other liabilities).
(4) Geographic classification for selected assets and liabilities is based on the domicile of the booking point of the subject assets and liabilities.
(5) Amounts have been revised from those previously presented.

Loans and acceptances by geography — Table 81

As at October 31 (Millions of Canadian dollars)	2016	2015	2014	2013	2012 (1)
Canada					
Residential mortgages	$ 241,800	$ 229,987	$ 215,624	$ 206,134	$ 195,552
Personal	82,205	84,637	86,984	86,102	80,000
Credit cards	16,601	15,516	14,650	13,902	13,422
Small business	3,878	4,003	4,067	4,026	2,503
Retail	344,484	334,143	321,325	310,164	291,477
Business	76,266	71,246	64,643	58,920	51,212
Sovereign (2)	8,586	8,508	3,840	3,807	3,751
Bank	1,278	530	413	823	390
Wholesale	$ 86,130	$ 80,284	$ 68,896	$ 63,550	$ 55,353
	$ 430,614	$ 414,427	$ 390,221	$ 373,714	$ 346,830
U.S.					
Retail	17,134	5,484	4,686	3,734	3,138
Wholesale	59,349	34,702	23,639	19,443	17,081
	76,483	40,186	28,325	23,177	20,219
Other International					
Retail	7,852	8,556	8,258	6,768	5,673
Wholesale	21,733	24,536	21,881	17,103	16,900
	29,585	33,092	30,139	23,871	22,573
Total loans and acceptances	$ 536,682	$ 487,705	$ 448,685	$ 420,762	$ 389,622
Total allowance for loan losses	(2,235)	(2,029)	(1,994)	(1,959)	(1,996)
Total loans and acceptances, net of allowance for loan losses	$ 534,447	$ 485,676	$ 446,691	$ 418,803	$ 387,626

(1) On a continuing operations basis.
(2) In 2015, we reclassified $4 billion from AFS securities to Loans.

Loans and acceptances by portfolio and sector					Table 82
As at October 31 (Millions of Canadian dollars)	**2016**	2015	2014	2013	2012 (1)
Residential mortgages	**$ 254,998**	$ 233,975	$ 219,257	$ 209,238	$ 198,324
Personal	**93,466**	94,346	96,021	93,260	85,800
Credit cards	**17,128**	15,859	14,924	14,142	13,661
Small business	**3,878**	4,003	4,067	4,026	2,503
Retail	**$ 369,470**	$ 348,183	$ 334,269	$ 320,666	$ 300,288
Business					
Agriculture	**6,515**	6,057	5,694	5,441	5,202
Automotive	**7,279**	6,614	6,209	6,167	3,585
Consumer goods	**10,052**	7,146	7,172	6,230	5,432
Energy					
Oil & gas	**6,259**	7,691	5,849	5,046	4,981
Utilities	**7,680**	5,162	3,766	3,860	3,821
Financial products	**8,840**	10,093	3,670	3,162	4,316
Forest products	**1,099**	1,169	979	893	811
Health services	**7,763**	6,023	4,052	3,786	3,766
Holding and investments	**7,195**	6,935	6,865	4,973	4,625
Industrial products	**5,508**	4,725	4,665	4,038	3,938
Mining & metals	**1,455**	1,402	1,320	1,074	965
Non-bank financial services	**8,408**	6,428	5,688	4,903	3,895
Other services	**11,582**	8,834	8,322	8,090	7,003
Real estate & related	**40,419**	33,802	30,387	24,413	20,650
Technology & media	**11,019**	6,599	4,822	4,006	4,203
Transportation & environment	**6,060**	5,907	5,432	5,593	5,221
Other	**7,568**	3,248	3,695	2,705	1,737
Sovereign	**10,581**	9,887	4,628	4,396	4,193
Bank	**1,930**	1,800	1,201	1,320	990
Wholesale	**$ 167,212**	$ 139,522	$ 114,416	$ 100,096	$ 89,334
Total loans and acceptances	**$ 536,682**	$ 487,705	$ 448,685	$ 420,762	$ 389,622
Total allowance for loan losses	**(2,235)**	(2,029)	(1,994)	(1,959)	(1,996)
Total loans and acceptances, net of allowance for loan losses	**$ 534,447**	$ 485,676	$ 446,691	$ 418,803	$ 387,626

(1) On a continuing operations basis.

Impaired loans by portfolio and geography — Table 83

As at October 31 (Millions of Canadian dollars, except for percentage amounts)	2016	2015	2014	2013	2012 (1)
Residential mortgages	$ 709	$ 646	$ 678	$ 691	$ 674
Personal	304	299	300	363	273
Small business	46	45	47	37	33
Retail	1,059	990	1,025	1,091	980
Business					
Agriculture	$ 43	$ 41	$ 40	$ 43	$ 52
Automotive	43	11	12	12	17
Consumer goods	165	130	108	101	83
Energy					
Oil and gas	1,264	156	6	14	2
Utilities	78	57	–	–	–
Financing products	111	109	–	39	50
Forest products	21	28	25	26	30
Health services	21	17	18	25	17
Holding and investments	72	185	132	40	38
Industrial products	43	45	48	54	88
Mining & metals	15	17	9	2	2
Non-bank financial services	3	1	3	1	5
Other services	109	69	99	101	97
Real estate & related	241	297	314	367	353
Technology & media	93	34	38	117	251
Transportation & environment	45	53	32	98	73
Other	57	43	66	67	110
Sovereign	–	–	–	–	–
Bank	2	2	2	3	2
Wholesale	2,426	1,295	952	1,110	1,270
Acquired credit-impaired loans	418	–	–		
Total impaired loans (2)	$ 3,903	$ 2,285	$ 1,977	$ 2,201	$ 2,250
Canada					
Residential mortgages	$ 368	$ 356	$ 388	$ 464	$ 475
Personal	228	223	224	229	206
Small business	46	45	47	36	34
Retail	642	624	659	729	715
Business					
Agriculture	34	39	36	38	44
Automotive	9	8	11	9	11
Consumer goods	91	65	70	58	34
Energy					
Oil & gas	57	39	4	14	–
Utilities	15	20	–	–	–
Financing products	–	–	–	–	–
Forest products	21	5	6	8	12
Health services	18	17	19	15	15
Holding and investments	5	3	3	3	22
Industrial products	39	39	41	40	34
Mining & metals	12	7	9	2	2
Non-bank financial services	–	–	1	1	3
Other services	49	51	67	59	50
Real estate & related	121	161	171	169	153
Technology & media	27	34	37	86	238
Transportation & environment	24	29	11	21	22
Other	–	(5)	1	3	1
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	522	512	487	526	641
Total	$ 1,164	$ 1,136	$ 1,146	$ 1,255	$ 1,356
U.S.					
Retail	$ 56	$ 10	$ 13	$ 14	$ 7
Wholesale	1,736	204	18	98	162
Total	$ 1,792	$ 214	$ 31	$ 112	$ 169
Other International					
Retail	$ 380	$ 356	$ 353	$ 348	$ 258
Wholesale	567	579	447	486	467
Total	$ 947	$ 935	$ 800	$ 834	$ 725
Total impaired loans	$ 3,903	$ 2,285	$ 1,977	$ 2,201	$ 2,250
Allowance for impaired loans	(809)	(654)	(632)	(599)	(636)
Net impaired loans	$ 3,094	$ 1,631	$ 1,345	$ 1,602	$ 1,614
Gross impaired loans as a % of loans and acceptances					
Residential mortgages	0.28%	0.28%	0.31%	0.33%	0.34%
Personal	0.33%	0.32%	0.31%	0.39%	0.32%
Small business	1.19%	1.13%	1.16%	0.83%	1.32%
Retail	0.29%	0.28%	0.31%	0.34%	0.33%
Wholesale	1.69%	0.93%	0.84%	1.11%	1.42%
Total	0.73%	0.47%	0.44%	0.52%	0.58%
Allowance for impaired loans as a % of gross impaired loans	20.72%	28.64%	31.98%	27.22%	28.33%

(1) On a continuing operations basis.

(2) Past due loans greater than 90 days not included in impaired loans were $337 million in 2016 (2015 – $314 million; 2014 – $316 million; 2013 – $346 million; 2012 – $393 million).

Provision for credit losses by portfolio and geography — Table 84

(Millions of Canadian dollars, except for percentage amounts)	2016	2015	2014	2013	2012 (1)
Residential mortgages	$ 77	$ 47	$ 94	$ 41	$ 67
Personal	458	388	441	458	445
Credit cards	442	378	353	354	394
Small business	34	32	44	32	43
Retail	$ 1,011	$ 845	$ 932	$ 885	$ 949
Business					
Agriculture	$ 10	$ 9	$ 3	$ 4	$ 8
Automotive	13	3	2	3	(2)
Consumer goods	20	33	27	17	27
Energy					
Oil and gas	320	47	(5)	(6)	(11)
Utilities	16	9	32	–	
Financial products	1	39	3	1	2
Forest products	4	6	7	4	5
Health services	4	–	–	–	–
Holding and investments	–	18	29	(6)	(1)
Industrial products	12	4	14	21	32
Mining & metals	7	8	2	1	–
Non-bank financial services	–	7	–	10	1
Other services	(5)	4	18	14	(3)
Real estate & related	36	29	58	62	82
Technology & media	8	5	14	157	102
Transportation & environment	(4)	8	2	35	47
Other	36	24	26	35	63
Sovereign	–	–	–	–	–
Bank	(3)	(1)	–	–	–
Wholesale	$ 475	$ 252	$ 232	$ 352	$ 352
Acquired credit-impaired loans	10	–	–	–	–
Total provision for credit losses on impaired loans	$ 1,496	$ 1,097	$ 1,164	$ 1,237	$ 1,301
Canada					
Residential mortgages	$ 42	$ 27	$ 27	$ 27	$ 34
Personal	459	393	393	391	413
Credit cards	435	371	345	346	391
Small business	34	32	44	32	43
Retail	$ 970	$ 823	$ 809	$ 796	$ 881
Business					
Agriculture	10	9	4	4	8
Automotive	3	3	3	3	(2)
Consumer goods	19	21	25	16	13
Energy					
Oil & gas	99	22	(5)	(6)	(11)
Utilities	–	1	–	–	–
Financing products	–	–	–	–	–
Forest products	5	1	1	3	5
Health services	4	–	–	–	–
Holding and investments	–	–	–	(8)	–
Industrial products	10	7	14	14	12
Mining & metals	7	3	2	1	–
Non-bank financial services	–	–	–	–	1
Other services	14	–	6	3	–
Real estate & related	26	13	34	37	43
Technology & media	2	6	14	50	98
Transportation & environment	8	7	3	2	10
Other	6	23	22	30	30
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	$ 213	$ 116	$ 123	$ 149	$ 207
Total	$ 1,183	$ 939	$ 932	$ 945	$ 1,088
U.S.					
Retail	1	1	2	3	4
Wholesale	227	40	40	32	29
	$ 228	$ 41	$ 42	$ 35	$ 33
Other International					
Retail	41	21	121	86	64
Wholesale	44	96	69	171	116
	$ 85	$ 117	$ 190	$ 257	$ 180
Total provision for credit losses on impaired loans	$ 1,496	$ 1,097	$ 1,164	$ 1,237	$ 1,301
Total provision for credit losses on non-impaired loans	50	–	–	–	(2)
Total provision for credit losses	$ 1,546	$ 1,097	$ 1,164	$ 1,237	$ 1,299
Total PCL as a % of average net loans and acceptances	0.29%	0.24%	0.27%	0.31%	0.35%
PCL on impaired loans as a % of average net loans and acceptances	0.28%	0.24%	0.27%	0.31%	0.35%

(1) On a continuing operations basis.

Allowance for credit losses by portfolio and geography — Table 85

(Millions of Canadian dollars, except percentage amounts)	2016	2015	2014	2013	2012 (1), (2)
Allowance at beginning of year	$ 2,120	$ 2,085	$ 2,050	$ 2,087	$ 2,056
Provision for credit losses	1,546	1,097	1,164	1,237	1,299
Write-offs by portfolio					
Residential mortgages	(42)	(64)	(30)	(24)	(32)
Personal	(556)	(494)	(565)	(498)	(499)
Credit cards	(564)	(497)	(466)	(466)	(496)
Small business	(40)	(40)	(47)	(35)	(50)
Retail	$ (1,202)	$ (1,095)	$ (1,108)	$ (1,023)	$ (1,077)
Business	$ (321)	$ (243)	$ (221)	$ (448)	$ (288)
Sovereign	–	–	–	–	–
Bank	–	–	–	–	(32)
Wholesale	$ (321)	$ (243)	$ (221)	$ (448)	$ (320)
Total write-offs by portfolio	$ (1,523)	$ (1,338)	$ (1,329)	$ (1,471)	$ (1,397)
Recoveries by portfolio					
Residential mortgages	$ 5	$ 7	$ 2	$ 2	$ 1
Personal	111	105	106	96	83
Credit cards	122	119	114	112	102
Small business	10	10	9	9	8
Retail	$ 248	$ 241	$ 231	$ 219	$ 194
Business	$ 38	$ 33	$ 32	$ 51	$ 39
Sovereign	–	–	–	–	–
Bank	–	1	–	–	–
Wholesale	$ 38	$ 34	$ 32	$ 51	$ 39
Total recoveries by portfolio	$ 286	$ 275	$ 263	$ 270	$ 233
Net write-offs	$ (1,237)	$ (1,063)	$ (1,066)	$ (1,201)	$ (1,164)
Adjustments (3)	(103)	1	(63)	(73)	(104)
Total allowance for credit losses at end of year	$ 2,326	$ 2,120	$ 2,085	$ 2,050	$ 2,087
Allowance against impaired loans					
Canada					
Residential mortgages	$ 35	$ 27	$ 31	$ 36	$ 41
Personal	105	96	93	97	89
Small business	20	19	19	16	12
Retail	$ 160	$ 142	$ 143	$ 149	$ 142
Business					
Agriculture	$ 6	$ 5	$ 6	$ 6	$ 9
Automotive	4	4	4	4	7
Consumer goods	14	12	22	15	14
Energy					
Oil & gas	6	–	–	1	1
Utilities	–	1	–	–	–
Financing products	–	–	–	–	–
Forest products	5	3	3	4	6
Health services	6	6	6	6	6
Holding and investments	1	1	1	2	10
Industrial products	11	13	18	15	10
Mining and metals	4	1	1	1	1
Non-bank financial services	–	–	–	–	–
Other services	18	19	28	23	20
Real estate & related	23	28	48	42	45
Technology & media	10	12	17	46	107
Transportation & environment	11	7	5	6	8
Other	–	(1)	1	(1)	(5)
Sovereign	–	–	–	–	–
Bank	–	–	–	–	–
Wholesale	$ 119	$ 111	$ 160	$ 170	$ 239
	$ 279	$ 253	$ 303	$ 319	$ 381
U.S.					
Retail	$ 2	$ 1	$ 1	$ 2	$ 1
Wholesale	177	47	16	19	38
	$ 179	$ 48	$ 17	$ 21	$ 39
Other International					
Retail	$ 180	$ 169	$ 172	$ 146	$ 96
Wholesale	171	184	140	113	120
	$ 351	$ 353	$ 312	$ 259	$ 216
Total allowance against impaired loans	$ 809	$ 654	$ 632	$ 599	$ 636
Allowance against non-impaired loans					
Residential mortgages	$ 96	$ 83	$ 78	$ 48	$ 48
Personal	385	396	400	405	392
Credit cards	386	386	385	385	403
Small business	45	45	45	45	60
Retail	$ 912	$ 910	$ 908	$ 883	$ 903
Wholesale	$ 514	$ 465	$ 454	$ 477	$ 457
Off-balance sheet and other items	$ 91	$ 91	$ 91	$ 91	$ 91
Total allowance against non-impaired loans	$ 1,517	$ 1,466	$ 1,453	$ 1,451	$ 1,451
Total allowance for credit losses	$ 2,326	$ 2,120	$ 2,085	$ 2,050	$ 2,087
Key ratios					
Allowance for credit losses as a % of loans and acceptances	0.43%	0.43%	0.46%	0.49%	0.54%
Net write-offs as a % of average net loans and acceptances	0.23%	0.23%	0.25%	0.30%	0.31%

(1) On a continuing operations basis.
(2) Opening allowance for credit losses as at November 1, 2011 has been restated due to the implementation of amendments to IFRS 11.
(3) Under IFRS, other adjustments include $100 million of unwind of discount and $3 million of changes in exchange rate (2015 – $80 million and $(81) million; 2014 – $87 million and $(24) million; 2013 – $86 million and $(13) million). For further details, refer to Note 5 of our audited 2016 Annual Consolidated Financial Statements.

Credit quality information by Canadian province					Table 86
(Millions of Canadian dollars)	2016	2015	2014	2013	2012 (1)
Loans and acceptances					
Atlantic provinces (2)	$ 23,947	$ 23,040	$ 22,130	$ 21,263	$ 19,953
Quebec	53,518	51,197	50,748	48,060	42,920
Ontario	185,434	175,315	159,817	152,258	141,566
Alberta	66,277	28,607	61,197	58,318	53,987
Other Prairie provinces (3)	30,143	65,785	27,341	25,697	23,200
B.C. and territories (4)	71,295	70,483	68,988	68,118	65,204
Total loans and acceptances in Canada	$ 430,614	$ 414,427	$ 390,221	$ 373,714	$ 346,830
Gross impaired loans					
Atlantic provinces (2)	$ 101	$ 93	$ 81	$ 83	$ 67
Quebec	207	213	205	177	180
Ontario	336	341	391	424	502
Alberta	313	224	185	233	250
Other Prairie provinces (3)	93	115	73	97	88
B.C. and territories (4)	114	150	211	241	269
Total gross impaired loans in Canada	$ 1,164	$ 1,136	$ 1,146	$ 1,255	$ 1,356
Provision for credit losses on impaired loans					
Atlantic provinces (2)	$ 67	$ 57	$ 51	$ 50	$ 62
Quebec	92	96	92	78	96
Ontario	654	590	588	605	704
Alberta	226	77	71	74	79
Other Prairie provinces (3)	64	52	40	39	41
B.C. and territories (4)	80	67	90	99	106
Total provision for credit losses on impaired loans in Canada	$ 1,183	$ 939	$ 932	$ 945	$ 1,088

(1) On a continuing operations basis.
(2) Comprises Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick.
(3) Comprises Manitoba and Saskatchewan.
(4) Comprises British Columbia, Nunavut, Northwest Territories and Yukon.

EDTF recommendations index

On October 29, 2012, the Enhanced Disclosure Task Force (EDTF), established by the Financial Stability Board, issued its report Enhancing the Risk Disclosures of Banks, which included 32 recommendations aimed at achieving transparent, high-quality risk disclosures. As a result, our enhanced disclosures have been provided in our 2016 Annual Report and Supplementary Financial Information package (SFI).

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	115	1
	2	Define risk terminology and measures	49-54, 208-210	–
	3	Top and emerging risks	47-49	–
	4	New regulatory ratios	90-93	–
Risk governance, risk management and business model	5	Risk management organization	49-54	–
	6	Risk culture	49-51	–
	7	Risk in the context of our business activities	98	–
	8	Stress testing	51-52, 67	–
Capital adequacy and risk-weighted assets (RWA)	9	Minimum Basel III capital ratios and Domestic systemically important bank surcharge	90-93	–
	10	Composition of capital and reconciliation of the accounting balance sheet to the regulatory balance sheet	–	21-24
	11	Flow statement of the movements in regulatory capital	–	25
	12	Capital strategic planning	89-93	–
	13	RWA by business segments	–	28
	14	Analysis of capital requirement, and related measurement model information	54-58	26-27
	15	RWA credit risk and related risk measurements	–	42-44
	16	Movement of risk-weighted assets by risk type	–	28
	17	Basel back-testing	52, 56	42
Liquidity	18	Quantitative and qualitative analysis of our liquidity reserve	73-75, 78-79	–
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	66-70	–
	24	Market risk validation and back-testing	67	–
	25	Primary risk management techniques beyond reported risk measures and parameters	66-71	–
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	27	Policies for identifying impaired loans	57-58, 101 131-132	–
	28	Reconciliation of the opening and closing balances of impaired loans and impairment allowances during the year	–	33,37
	29	Quantification of gross notional exposure for OTC derivatives or exchange-traded derivatives	60	46
	30	Credit risk mitigation, including collateral held for all sources of credit risk	57	41
Other	31	Other risk types	82-89	–
	32	Publicly known risk events	85-87, 195-196	–