REPORTS AND CONSOLIDATED FINANCIAL STATEMENTS

Management's Responsibility for Financial Reporting

The accompanying consolidated financial statements of Royal Bank of Canada were prepared by management, which is responsible for the integrity and fairness of the information presented, including the many amounts that must of necessity be based on estimates and judgments. These consolidated financial statements were prepared in accordance with the *Bank Act* (Canada) and International Financial Reporting Standards as issued by the International Accounting Standards Board. Financial information appearing throughout our Management's Discussion and Analysis is consistent with these consolidated financial statements.

Our internal controls are designed to provide reasonable assurance that transactions are authorized, assets are safeguarded and proper records are maintained. These controls include quality standards in hiring and training of employees, policies and procedures manuals, a corporate code of conduct and accountability for performance within appropriate and well-defined areas of responsibility.

The system of internal controls is further supported by a compliance function, which is designed to ensure that we and our employees comply with securities legislation and conflict of interest rules, and by an internal audit staff, which conducts periodic audits of all aspects of our operations.

The Board of Directors oversees management's responsibilities for financial reporting through an Audit Committee, which is composed entirely of independent directors. This Committee reviews our consolidated financial statements and recommends them to the Board for approval. Other key responsibilities of the Audit Committee include reviewing our existing internal control procedures and planned revisions to those procedures, and advising the directors on auditing matters and financial reporting issues. Our Chief Compliance Officer and Chief Internal Auditor have full and unrestricted access to the Audit Committee.

The Office of the Superintendent of Financial Institutions Canada (OSFI) examines and inquires into our business and affairs as deemed necessary to determine whether the provisions of the *Bank Act* are being complied with, and that we are in sound financial condition. In carrying out its mandate, OSFI strives to protect the rights and interests of our depositors and creditors.

PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm appointed by our shareholders upon the recommendation of the Audit Committee and Board, has performed an independent audit of the consolidated financial statements and their report follows. The auditors have full and unrestricted access to the Audit Committee to discuss their audit and related findings.

David I. McKay
President and Chief Executive Officer

Rod Bolger
Chief Financial Officer

Toronto, November 27, 2018

Management's Report on Internal Control over Financial Reporting

Management of Royal Bank of Canada is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is a process designed by, or under the supervision of, the President and Chief Executive Officer and Chief Financial Officer and effected by the Board of Directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with International Financial Reporting Standards as issued by the International Accounting Standards Board. It includes those policies and procedures that:

- Pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions related to and dispositions of our assets;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and our receipts and expenditures are made only in accordance with authorizations of our management and directors; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of our assets that could have a material effect on our financial statements.

Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements on a timely basis. Also, projections of any evaluation of the effectiveness of internal control over financial reporting to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management evaluated, under the supervision of and with the participation of the President and Chief Executive Officer and Chief Financial Officer, the effectiveness of our internal control over financial reporting as of October 31, 2018, based on the criteria set forth in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on that evaluation, management concluded that, as of October 31, 2018, internal control over financial reporting was effective based on the criteria established in the *Internal Control – Integrated Framework (2013)*.

The effectiveness of our internal control over financial reporting as of October 31, 2018, has been audited by PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm.

David I. McKay
President and Chief Executive Officer

Rod Bolger
Chief Financial Officer

Toronto, November 27, 2018

Report of Independent Registered Public Accounting Firm

To the Shareholders and Directors of Royal Bank of Canada

Opinions on the Financial Statements and Internal Control over Financial Reporting
We have audited the accompanying consolidated balance sheets of Royal Bank of Canada and its subsidiaries (the Bank) as of October 31, 2018 and October 31, 2017, and the related consolidated statements of income, comprehensive income, changes in equity and cash flows for the years then ended, including the related notes, which comprise a summary of significant accounting policies and other explanatory information (collectively referred to as the consolidated financial statements). We also have audited the Bank's internal control over financial reporting as of October 31, 2018, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Bank as of October 31, 2018 and October 31, 2017, and its financial performance and its cash flows for the years then ended in conformity with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board. Also in our opinion, the Bank maintained, in all material respects, effective internal control over financial reporting as of October 31, 2018, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle
Without qualifying our opinion on the consolidated financial statements, we draw attention to Note 2 to the consolidated financial statements, which indicates that the Bank has changed the manner in which it accounts for financial instruments in 2018 due to the adoption of IFRS 9, *Financial Instruments*.

Basis for Opinions
Management's Responsibility for the Consolidated Financial Statements and Internal Control over Financial Reporting
The Bank's management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board, for maintaining effective internal control over financial reporting necessary to enable the preparation of the consolidated financial statements that are free from material misstatement, whether due to fraud or error, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting.

Auditor's Responsibility
Our responsibility is to express opinions on the Bank's consolidated financial statements and on the Bank's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States)(PCAOB) and are required to be independent with respect to the Bank in accordance with the ethical requirements that are relevant to our audits, which include those set forth in Canada, the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits of the Bank's consolidated financial statements and of its internal control over financial reporting in accordance with the standards of the PCAOB and we also conducted our audits of the Bank's consolidated financial statements in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects. Those standards also require that we comply with ethical requirements.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the Bank's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances. Our audits also included evaluating the appropriateness of accounting policies and principles used and the reasonableness of significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting
A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

PricewaterhouseCoopers LLP

Chartered Professional Accountants, Licensed Public Accountants
Toronto, Canada
November 27, 2018

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

Consolidated Balance Sheets

(Millions of Canadian dollars)	As at October 31 2018	October 31 2017
Assets		
Cash and due from banks	$ 30,209	$ 28,407
Interest-bearing deposits with banks	36,471	32,662
Securities (Notes 2 and 4)		
Trading	128,258	127,657
Investment, net of applicable allowance	94,608	90,722
	222,866	218,379
Assets purchased under reverse repurchase agreements and securities borrowed	294,602	220,977
Loans (Notes 2 and 5)		
Retail	399,452	385,170
Wholesale	180,278	159,606
	579,730	544,776
Allowance for loan losses (Notes 2 and 5)	(2,912)	(2,159)
	576,818	542,617
Segregated fund net assets (Note 15)	1,368	1,216
Other		
Customers' liability under acceptances	15,641	16,459
Derivatives (Note 8)	94,039	95,023
Premises and equipment (Note 9)	2,832	2,670
Goodwill (Note 10)	11,137	10,977
Other intangibles (Note 10)	4,687	4,507
Other assets (Note 12)	44,064	38,959
	172,400	168,595
Total assets	$ 1,334,734	$ 1,212,853
Liabilities and equity		
Deposits (Note 13)		
Personal	$ 270,154	$ 260,213
Business and government	534,371	505,665
Bank	32,521	23,757
	837,046	789,635
Segregated fund net liabilities (Note 15)	1,368	1,216
Other		
Acceptances	15,662	16,459
Obligations related to securities sold short	32,247	30,008
Obligations related to assets sold under repurchase agreements and securities loaned	206,814	143,084
Derivatives (Note 8)	90,238	92,127
Insurance claims and policy benefit liabilities (Note 14)	10,000	9,676
Other liabilities (Note 17)	52,273	46,955
	407,234	338,309
Subordinated debentures (Note 18)	9,131	9,265
Total liabilities	1,254,779	1,138,425
Equity attributable to shareholders (Note 20)		
Preferred shares	6,309	6,413
Common shares	17,617	17,703
Retained earnings	51,112	45,359
Other components of equity	4,823	4,354
	79,861	73,829
Non-controlling interests (Note 20)	94	599
Total equity	79,955	74,428
Total liabilities and equity	$ 1,334,734	$ 1,212,853

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

David I. McKay
President and Chief Executive Officer

David F. Denison
Director

Consolidated Statements of Income

(Millions of Canadian dollars, except per share amounts)	For the year ended October 31 2018	October 31 2017
Interest and dividend income (Note 3)		
Loans	$ 21,249	$ 18,677
Securities	5,670	4,899
Assets purchased under reverse repurchase agreements and securities borrowed	5,536	3,021
Deposits and other	566	307
	33,021	26,904
Interest expense (Note 3)		
Deposits and other	9,603	6,564
Other liabilities	4,905	2,930
Subordinated debentures	322	270
	14,830	9,764
Net interest income	18,191	17,140
Non-interest income		
Insurance premiums, investment and fee income (Note 14)	4,279	4,566
Trading revenue	911	806
Investment management and custodial fees	5,377	4,803
Mutual fund revenue	3,551	3,339
Securities brokerage commissions	1,372	1,416
Service charges	1,800	1,770
Underwriting and other advisory fees	2,053	2,093
Foreign exchange revenue, other than trading	1,098	974
Card service revenue	1,054	933
Credit fees	1,394	1,433
Net gains on investment securities (Notes 2 and 4)	147	172
Share of profit in joint ventures and associates (Note 11)	21	335
Other	1,328	889
	24,385	23,529
Total revenue	42,576	40,669
Provision for credit losses (Notes 2, 4 and 5)	1,307	1,150
Insurance policyholder benefits, claims and acquisition expense (Note 14)	2,676	3,053
Non-interest expense		
Human resources (Notes 16 and 21)	13,776	13,330
Equipment	1,593	1,434
Occupancy	1,558	1,588
Communications	1,049	1,011
Professional fees	1,379	1,214
Amortization of other intangibles (Note 10)	1,077	1,015
Other	2,401	2,202
	22,833	21,794
Income before income taxes	15,760	14,672
Income taxes (Note 22)	3,329	3,203
Net income	$ 12,431	$ 11,469
Net income attributable to:		
Shareholders	$ 12,400	$ 11,428
Non-controlling interests	31	41
	$ 12,431	$ 11,469
Basic earnings per share (in dollars) (Note 23)	$ 8.39	$ 7.59
Diluted earnings per share (in dollars) (Note 23)	8.36	7.56
Dividends per common share (in dollars)	3.77	3.48

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

Consolidated Statements of Comprehensive Income

(Millions of Canadian dollars)	For the year ended October 31 2018	October 31 2017
Net income	$ 12,431	$ 11,469
Other comprehensive income (loss), net of taxes (Note 22)		
Items that will be reclassified subsequently to income:		
Net change in unrealized gains (losses) on available-for-sale securities		
Net unrealized gains (losses) on available-for-sale securities		134
Reclassification of net losses (gains) on available-for-sale securities to income		(96)
Net change in unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income		
Net unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income	(70)	
Provision for credit losses recognized in income	(9)	
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	(94)	
	(173)	38
Foreign currency translation adjustments		
Unrealized foreign currency translation gains (losses)	840	(1,570)
Net foreign currency translation gains (losses) from hedging activities	(237)	438
Reclassification of losses (gains) on foreign currency translation to income	–	(10)
	603	(1,142)
Net change in cash flow hedges		
Net gains (losses) on derivatives designated as cash flow hedges	150	622
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	107	(92)
	257	530
Items that will not be reclassified subsequently to income:		
Remeasurements of employee benefit plans (Note 16)	724	790
Net fair value change due to credit risk on financial liabilities designated as fair value through profit or loss	123	(323)
Net gains (losses) on equity securities designated at fair value through other comprehensive income	(2)	
	845	467
Total other comprehensive income (loss), net of taxes	1,532	(107)
Total comprehensive income (loss)	$ 13,963	$ 11,362
Total comprehensive income attributable to:		
Shareholders	$ 13,931	$ 11,323
Non-controlling interests	32	39
	$ 13,963	$ 11,362

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

Consolidated Statements of Changes in Equity

For the year ended October 31, 2017

(Millions of Canadian dollars)	Preferred shares	Common shares	Treasury shares – preferred	Treasury shares – common	Retained earnings	Other components of equity: Available-for-sale securities	FVOCI securities and loans	Foreign currency translation	Cash flow hedges	Total other components of equity	Equity attributable to shareholders	Non-controlling interests	Total equity
Balance at beginning of period	$ 6,713	$ 17,939	$ –	$ (80)	$ 41,519	$ 340		$ 4,685	$ (99)	$ 4,926	$ 71,017	$ 595	$ 71,612
Changes in equity													
Issues of share capital	–	227	–	–	(1)	–		–	–	–	226	–	226
Common shares purchased for cancellation	–	(436)	–	–	(2,674)	–		–	–	–	(3,110)	–	(3,110)
Redemption of trust capital securities	–	–	–	–	–	–		–	–	–	–	–	–
Redemption of preferred shares	(300)	–	–	–	–	–		–	–	–	(300)	–	(300)
Sales of treasury shares	–	–	130	4,414	–	–		–	–	–	4,544	–	4,544
Purchases of treasury shares	–	–	(130)	(4,361)	–	–		–	–	–	(4,491)	–	(4,491)
Share-based compensation awards	–	–	–	–	(40)	–		–	–	–	(40)	–	(40)
Dividends on common shares	–	–	–	–	(5,096)	–		–	–	–	(5,096)	–	(5,096)
Dividends on preferred shares and other	–	–	–	–	(300)	–		–	–	–	(300)	(34)	(334)
Other	–	–	–	–	56	–		–	–	–	56	(1)	55
Net income	–	–	–	–	11,428	–		–	–	–	11,428	41	11,469
Total other comprehensive income (loss), net of taxes	–	–	–	–	467	38		(1,140)	530	(572)	(105)	(2)	(107)
Balance at end of period	$ 6,413	$ 17,730	$ –	$ (27)	$ 45,359	$ 378		$ 3,545	$ 431	$ 4,354	$ 73,829	$ 599	$ 74,428

For the year ended October 31, 2018

(Millions of Canadian dollars)	Preferred shares	Common shares	Treasury shares – preferred	Treasury shares – common	Retained earnings	Other components of equity: Available-for-sale securities	FVOCI securities and loans	Foreign currency translation	Cash flow hedges	Total other components of equity	Equity attributable to shareholders	Non-controlling interests	Total equity
Balance at beginning of period	$ 6,413	$ 17,730	$ –	$ (27)	$ 45,359	$ 378		$ 3,545	$ 431	$ 4,354	$ 73,829	$ 599	$ 74,428
Transition adjustment (Note 2)	–	–	–	–	(558)	(378)	$ 299	–	–	(79)	(637)	–	(637)
Adjusted balance at beginning of period	$ 6,413	$ 17,730	$ –	$ (27)	$ 44,801	$ –	$ 299	$ 3,545	$ 431	$ 4,275	$ 73,192	$ 599	$ 73,791
Changes in equity													
Issues of share capital	–	92	–	–	–		–	–	–	–	92	–	92
Common shares purchased for cancellation	–	(187)	–	–	(1,335)		–	–	–	–	(1,522)	–	(1,522)
Redemption of trust capital securities	–	–	–	–	–		–	–	–	–	–	(500)	(500)
Redemption of preferred shares	(107)	–	–	–	2		–	–	–	–	(105)	–	(105)
Sales of treasury shares	–	–	259	5,479	–		–	–	–	–	5,738	–	5,738
Purchases of treasury shares	–	–	(256)	(5,470)	–		–	–	–	–	(5,726)	–	(5,726)
Share-based compensation awards	–	–	–	–	(10)		–	–	–	–	(10)	–	(10)
Dividends on common shares	–	–	–	–	(5,442)		–	–	–	–	(5,442)	–	(5,442)
Dividends on preferred shares and other	–	–	–	–	(285)		–	–	–	–	(285)	(37)	(322)
Other	–	–	–	–	136		(138)	–	–	(138)	(2)	–	(2)
Net income	–	–	–	–	12,400		–	–	–	–	12,400	31	12,431
Total other comprehensive income (loss), net of taxes	–	–	–	–	845		(173)	602	257	686	1,531	1	1,532
Balance at end of period	$ 6,306	$ 17,635	$ 3	$ (18)	$ 51,112		$ (12)	$ 4,147	$ 688	$ 4,823	$ 79,861	$ 94	$ 79,955

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

Consolidated Statements of Cash Flows

(Millions of Canadian dollars)	For the year ended October 31 2018	October 31 2017
Cash flows from operating activities		
Net income	$ 12,431	$ 11,469
Adjustments for non-cash items and others		
Provision for credit losses	1,307	1,150
Depreciation	569	600
Deferred income taxes	459	203
Amortization and impairment of other intangibles	1,083	1,017
Net changes in investments in joint ventures and associates	(1)	(331)
Losses (Gains) on sale of premises and equipment	–	(1)
Losses (Gains) on investment securities (Note 2)	(149)	(246)
Losses (Gains) on disposition of business	(40)	2
Impairment of available-for-sale securities		52
Adjustments for net changes in operating assets and liabilities		
Insurance claims and policy benefit liabilities	218	512
Net change in accrued interest receivable and payable	(88)	(90)
Current income taxes	(2,707)	(1,183)
Derivative assets	984	23,921
Derivative liabilities	(1,889)	(24,423)
Trading securities	2,297	23,624
Loans, net of securitizations	(41,477)	(22,608)
Assets purchased under reverse repurchase agreements and securities borrowed	(73,626)	(34,675)
Deposits, net of securitizations	48,749	33,296
Obligations related to assets sold under repurchase agreements and securities loaned	63,730	39,643
Obligations related to securities sold short	2,239	(20,361)
Brokers and dealers receivable and payable	147	601
Other	3,238	5,553
Net cash from (used in) operating activities	17,474	37,725
Cash flows from investing activities		
Change in interest-bearing deposits with banks	(3,809)	(4,811)
Proceeds from sale of investment securities (Note 2)	19,572	11,432
Proceeds from maturity of investment securities (Note 2)	37,536	40,844
Purchases of investment securities (Note 2)	(59,286)	(61,559)
Net acquisitions of premises and equipment and other intangibles	(1,980)	(1,364)
Proceeds from dispositions	14	–
Cash used in acquisitions	(65)	–
Net cash from (used in) investing activities	(8,018)	(15,458)
Cash flows from financing activities		
Redemption of trust capital securities	(500)	–
Repayment of subordinated debentures	–	(119)
Issue of common shares	72	199
Common shares purchased for cancellation	(1,522)	(3,110)
Redemption of preferred shares	(105)	(300)
Sales of treasury shares	5,738	4,544
Purchases of treasury shares	(5,726)	(4,491)
Dividends paid	(5,640)	(5,309)
Issuance costs	–	(1)
Dividends/distributions paid to non-controlling interests	(37)	(34)
Change in short-term borrowings of subsidiaries	–	(30)
Net cash from (used in) financing activities	(7,720)	(8,651)
Effect of exchange rate changes on cash and due from banks	66	(138)
Net change in cash and due from banks	1,802	13,478
Cash and due from banks at beginning of period (1)	28,407	14,929
Cash and due from banks at end of period (1)	$ 30,209	$ 28,407
Cash flows from operating activities include:		
Amount of interest paid	$ 13,524	$ 8,803
Amount of interest received	31,386	25,602
Amount of dividend received	1,706	1,729
Amount of income taxes paid	5,818	4,708

(1) We are required to maintain balances with central banks and other regulatory authorities. The total balances were $2.4 billion as at October 31, 2018 (October 31, 2017 – $2.3 billion; October 31, 2016 – $3.3 billion).

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

Note 1 General information

Royal Bank of Canada and its subsidiaries (the Bank) provide diversified financial services including Personal and Commercial Banking, Wealth Management, Insurance, Investor and Treasury Services and Capital Markets products and services on a global basis. Refer to Note 27 for further details on our business segments.

The parent bank, Royal Bank of Canada, is a Schedule I Bank under the *Bank Act* (Canada) incorporated and domiciled in Canada. Our corporate headquarters are located at Royal Bank Plaza, 200 Bay Street, Toronto, Ontario, Canada and our head office is located at 1 Place Ville-Marie, Montreal, Quebec, Canada. Our common shares are listed on the Toronto Stock Exchange and New York Stock Exchange with the ticker symbol RY.

These Consolidated Financial Statements are prepared in compliance with International Financial Reporting Standards (IFRS) as issued by the International Accounting Standards Board (IASB). Unless otherwise stated, monetary amounts are stated in Canadian dollars. Tabular information is stated in millions of dollars, except as noted. These Consolidated Financial Statements also comply with Subsection 308 of the Bank Act (Canada), which states that, except as otherwise specified by the OSFI, our Consolidated Financial Statements are to be prepared in accordance with IFRS. Except where otherwise noted, the accounting policies outlined in Note 2 have been consistently applied to all periods presented.

On November 27, 2018, the Board of Directors authorized the Consolidated Financial Statements for issue.

Note 2 Summary of significant accounting policies, estimates and judgments

The significant accounting policies used in the preparation of these Consolidated Financial Statements, including the accounting requirements prescribed by OSFI, are summarized below. These accounting policies conform, in all material respects, to IFRS. Except where otherwise noted, the same accounting policies have been applied to all periods presented.

General

Use of estimates and assumptions

In preparing our Consolidated Financial Statements, management is required to make subjective estimates and assumptions that affect the reported amount of assets, liabilities, net income and related disclosures. Estimates made by management are based on historical experience and other assumptions that are believed to be reasonable. Key sources of estimation uncertainty include: securities impairment, determination of fair value of financial instruments, the allowance for credit losses, insurance claims and policy benefit liabilities, pensions and other post-employment benefits, income taxes, carrying value of goodwill and other intangible assets, litigation provisions, and deferred revenue under the credit card customer loyalty reward program. Accordingly, actual results may differ from these and other estimates thereby impacting our future Consolidated Financial Statements. Refer to the relevant accounting policies in this Note for details on our use of estimates and assumptions.

Significant judgments

In preparation of these Consolidated Financial Statements, management is required to make significant judgments that affect the carrying amounts of certain assets and liabilities, and the reported amounts of revenues and expenses recorded during the period. Significant judgments have been made in the following areas and discussed as noted in the Consolidated Financial Statements:

Consolidation of structured entities	Note 2 Note 7	Securities impairment (under IAS 39)	Note 2 Note 4
Fair value of financial instruments	Note 2 Note 3	Application of the effective interest method	Note 2
Allowance for credit losses	Note 2 Note 4 Note 5	Derecognition of financial assets	Note 2 Note 6
Employee benefits	Note 2 Note 16	Income taxes	Note 2 Note 22
Goodwill and other intangibles	Note 2 Note 10	Provisions	Note 2 Note 24 Note 25

Basis of consolidation

Our Consolidated Financial Statements include the assets and liabilities and results of operations of the parent company, Royal Bank of Canada, and its subsidiaries including certain structured entities, after elimination of intercompany transactions, balances, revenues and expenses.

Consolidation

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

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

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

We consolidate all subsidiaries from the date we obtain control and cease consolidation when an entity is no longer controlled by us. Our consolidation conclusions affect the classification and amount of assets, liabilities, revenues and expenses reported in our Consolidated Financial Statements.

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

Investments in joint ventures and associates
Our investments in associated corporations and limited partnerships over which we have significant influence are accounted for using the equity method. The equity method is also applied to our interests in joint ventures over which we have joint control. Under the equity method of accounting, investments are initially recorded at cost, and the carrying amount is increased or decreased to recognize our share of the investee's net profit or loss, including our proportionate share of the investee's other comprehensive income (OCI), subsequent to the date of acquisition.

Non-current assets held for sale and discontinued operations
Non-current assets (and disposal groups) are classified as held for sale if their carrying amounts will be recovered principally through a sale transaction rather than through continuing use. This condition is satisfied when the asset is available for immediate sale in its present condition, management is committed to the sale, and it is highly probable to occur within one year. Non-current assets (and disposal groups) classified as held for sale are measured at the lower of their previous carrying amount and fair value less costs to sell and if significant, are presented separately from other assets on our Consolidated Balance Sheets.

A disposal group is classified as a discontinued operation if it meets the following conditions: (i) it is a component that can be distinguished operationally and financially from the rest of our operations and (ii) it represents either a separate major line of business or is part of a single co-ordinated plan to dispose of a separate major line of business or geographical area of operations. Disposal groups classified as discontinued operations are presented separately from our continuing operations in our Consolidated Statements of Income.

Financial Instruments
Changes in accounting policies
During the first quarter, we adopted IFRS 9 *Financial Instruments* (IFRS 9). As a result of the application of IFRS 9, we changed our accounting policies in the areas indicated below, and these new policies were applicable from November 1, 2017. As permitted by the transition provisions of IFRS 9, we elected not to restate comparative period results; accordingly, all comparative period information is presented in accordance with our previous accounting policies, as indicated below. Adjustments to carrying amounts of financial assets and liabilities at the date of initial application (November 1, 2017) were recognized in opening Retained earnings and Other components of equity in the current period. New or amended disclosures have been provided for the current period, where applicable, and comparative period disclosures are consistent with those made in the prior year.

Policies applicable beginning November 1, 2017 (IFRS 9)

Classification of financial assets (IFRS 9)
Financial assets are measured at initial recognition at fair value, and are classified and subsequently measured at fair value through profit or loss (FVTPL), fair value through other comprehensive income (FVOCI) or amortized cost based on our business model for managing the financial instruments and the contractual cash flow characteristics of the instrument.

Debt instruments are measured at amortized cost if both of the following conditions are met and the asset is not designated as FVTPL: (a) the asset is held within a business model that is Held-to-Collect (HTC) as described below, and (b) the contractual terms of the instrument give rise to cash flows that are solely payments of principal and interest on the principal amount outstanding (SPPI).

Debt instruments are measured at FVOCI if both of the following conditions are met and the asset is not designated as FVTPL: (a) the asset is held within a business model that is Held-to-Collect-and-Sell (HTC&S) as described below, and (b) the contractual terms of the instrument give rise, on specified dates, to cash flows that are SPPI.

All other debt instruments are measured at FVTPL.

Equity instruments are measured at FVTPL, unless the asset is not held for trading purposes and we make an irrevocable election to designate the asset as FVOCI. This election is made on an instrument-by-instrument basis.

Business model assessment
We determine our business models at the level that best reflects how we manage portfolios of financial assets to achieve our business objectives. Judgment is used in determining our business models, which is supported by relevant, objective evidence including:

- How the economic activities of our businesses generate benefits, for example through trading revenue, enhancing yields or hedging funding or other costs and how such economic activities are evaluated and reported to key management personnel;
- The significant risks affecting the performance of our businesses, for example, market risk, credit risk, or other risks as described in the Risk Management section of Management's Discussion and Analysis, and the activities undertaken to manage those risks;
- Historical and future expectations of sales of the loans or securities portfolios managed as part of a business model; and
- The compensation structures for managers of our businesses, to the extent that these are directly linked to the economic performance of the business model.

Our business models fall into three categories, which are indicative of the key strategies used to generate returns:

- HTC: The objective of this business model is to hold loans and securities to collect contractual principal and interest cash flows. Sales are incidental to this objective and are expected to be insignificant or infrequent.
- HTC&S: Both collecting contractual cash flows and sales are integral to achieving the objective of the business model.
- Other fair value business models: These business models are neither HTC nor HTC&S, and primarily represent business models where assets are held-for-trading or managed on a fair value basis.

SPPI assessment
Instruments held within a HTC or HTC&S business model are assessed to evaluate if their contractual cash flows are comprised of solely payments of principal and interest. SPPI payments are those which would typically be expected from basic lending arrangements. Principal amounts include par repayments from lending and financing arrangements, and interest primarily relates to basic lending returns, including compensation for credit risk and the time value of money associated with the principal amount outstanding over a period of time. Interest can also include other basic lending risks and costs (for example, liquidity risk, servicing or administrative costs) associated with holding the financial asset for a period of time, and a profit margin.

Where the contractual terms introduce exposure to risk or variability of cash flows that are inconsistent with a basic lending arrangement, the related financial asset is classified and measured at FVTPL.

Securities (IFRS 9)
Trading securities include all securities that are classified as FVTPL by nature and securities designated as FVTPL. Obligations to deliver trading securities sold but not yet purchased are recorded as liabilities and carried at fair value. Realized and unrealized gains and losses on these securities are generally recorded as Trading revenue or Non-interest income – Other. Dividends and interest income accruing on Trading securities are recorded in Interest income. Interest and dividends accrued on interest-bearing and equity securities sold short are recorded in Interest expense.

Investment securities include all securities classified as FVOCI and amortized cost. All investment securities are initially recorded at fair value and subsequently measured according to the respective classification.

Investment securities carried at amortized cost are measured using the effective interest method, and are presented net of any allowance for credit losses, calculated in accordance with our policy for Allowance for credit losses, as described below. Interest income, including the amortization of premiums and discounts on securities measured at amortized cost are recorded in interest income. Impairment gains or losses recognized on amortized cost securities are recorded in Provision for credit losses (PCL). When a debt instrument measured at amortized cost is sold, the difference between the sale proceeds and the amortized cost of the security at the time of the sale is recorded as Net gains on Investment securities in Non-interest income.

Debt securities carried at FVOCI are measured at fair value with unrealized gains and losses arising from changes in fair value included in Other components of equity. Impairment gains and losses are included in PCL and correspondingly reduce the accumulated changes in fair value included in Other components of equity. When a debt instrument measured at FVOCI is sold, the cumulative gain or loss is reclassified from Other components of equity to Net gains on Investment securities in Non-interest income.

Equity securities carried at FVOCI are measured at fair value. Unrealized gains and losses arising from changes in fair value are recorded in Other components of equity and not subsequently reclassified to profit or loss when realized. Dividends from FVOCI equity securities are recognized in Interest income.

We account for all of our securities using settlement date accounting and changes in fair value between the trade date and settlement date are reflected in income for securities measured at FVTPL, and changes in the fair value of securities measured at FVOCI between the trade and settlement dates are recorded in OCI except for changes in foreign exchange rates on debt securities, which are recorded in Non-interest income-Other.

Fair value option (IFRS 9)
A financial instrument with a reliably measurable fair value can be designated as FVTPL (the fair value option) on its initial recognition even if the financial instrument was not acquired or incurred principally for the purpose of selling or repurchasing. The fair value option can be used for financial assets if it eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise from measuring assets or liabilities, or recognizing related gains and losses on a different basis (an accounting mismatch). The fair value option can be elected for financial liabilities if: (i) the election eliminates an accounting mismatch; (ii) the financial liability is part of a portfolio that is managed on a fair value basis, in accordance with a documented risk management or investment strategy; or (iii) there is an embedded derivative in the financial or non-financial host contract and the derivative is not closely related to the host contract. These instruments cannot be reclassified out of the FVTPL category while they are held or issued.

Financial assets designated as FVTPL are recorded at fair value and any unrealized gain or loss arising due to changes in fair value is included in Trading revenue or Non-interest income – Other, depending on our business purpose for holding the financial asset.

Financial liabilities designated as FVTPL are recorded at fair value and fair value changes attributable to changes in our own credit risk are recorded in OCI. Own credit risk amounts recognized in OCI will not be reclassified subsequently to net income. The remaining fair value changes not attributable to changes in our own credit risk are recorded in Trading revenue or Non-interest income – Other, depending on our business purpose for holding the financial liability. Upon initial recognition, if we determine that presenting the effects of own credit risk changes in OCI would create or enlarge an accounting mismatch in net income, the full fair value change in our debt designated as FVTPL is recognized in net income. To make that determination, we assess whether we expect that the effects of changes in the liability's credit risk will be offset in profit or loss by a change in the fair value of another financial instrument measured at FVTPL. Such an expectation is based on an economic relationship between the characteristics of the liability and the characteristics of the other financial instrument. The determination is made at initial recognition and is not reassessed. To determine the fair value adjustments on our debt instruments designated as FVTPL, we calculate the present value of the instruments based on the contractual cash flows over the term of the arrangement by using our effective funding rate at the beginning and end of the period.

Loans (IFRS 9)
Loans are debt instruments recognized initially at fair value and are subsequently measured in accordance with the Classification of financial assets policy provided above. The majority of our loans are carried at amortized cost using the effective interest method, which represents the gross carrying amount less allowance for credit losses.

Interest on loans is recognized in Interest income using the effective interest method. The estimated future cash flows used in this calculation include those determined by the contractual term of the asset and all fees that are considered to be integral to the effective interest rate. Also included in this amount are transaction costs and all other premiums or discounts. Fees that relate to activities such as originating, restructuring or renegotiating loans are deferred and recognized as Interest income over the expected term of such loans using the effective interest method. Where there is a reasonable expectation that a loan will be originated, commitment and standby fees are also recognized as interest income over the expected term of the resulting loans using the effective interest method. Otherwise, such fees are recorded as other liabilities and amortized into Non-interest income over the commitment or standby period. Future prepayment fees on mortgage loans are not included as part of the effective interest rate at origination. If prepayment fees are received on a renewal of a mortgage loan before maturity, the fee is included as part of the effective interest rate, and if not renewed, the prepayment fee is recognized in interest income at the prepayment date.

For loans carried at amortized cost or FVOCI, impairment losses are recognized at each balance sheet date in accordance with the three-stage impairment model outlined below.

Allowance for credit losses (IFRS 9)
An allowance for credit losses (ACL) is established for all financial assets, except for financial assets classified or designated as FVTPL and equity securities designated as FVOCI, which are not subject to impairment assessment. Assets subject to impairment assessment include certain loans, debt securities, interest-bearing deposits with banks, customers' liability under acceptances, accounts and accrued interest receivable,

and finance and operating lease receivables. ACL on loans is presented in Allowance for loan losses. ACL on debt securities measured at FVOCI is presented in Other components of equity. Other financial assets carried at amortized cost are presented net of ACL on our Consolidated Balance Sheets.

Off-balance sheet items subject to impairment assessment include financial guarantees and undrawn loan commitments. For certain retail products, expected credit losses are measured based on the total exposure and are not attributable to the on- and off-balance sheet components. For these products, ACL is presented in Allowance for loan losses to the extent that ACL does not exceed the related loan balance, and thereafter presented in Other Liabilities – Provisions. For all other off-balance sheet products subject to impairment assessment, ACL is separately calculated and included in Other Liabilities – Provisions.

We measure the ACL on each balance sheet date according to a three-stage expected credit loss impairment model:

- Performing financial assets
  - Stage 1 – From initial recognition of a financial asset to the date on which the asset has experienced a significant increase in credit risk relative to its initial recognition, a loss allowance is recognized equal to the credit losses expected to result from defaults occurring over the 12 months following the reporting date.
  - Stage 2 – Following a significant increase in credit risk relative to the initial recognition of the financial asset, a loss allowance is recognized equal to the credit losses expected over the remaining lifetime of the asset.
- Impaired financial assets
  - Stage 3 – When a financial asset is considered to be credit-impaired, a loss allowance is recognized equal to credit losses expected over the remaining lifetime of the asset. Interest revenue is calculated based on the carrying amount of the asset, net of the loss allowance, rather than on its gross carrying amount.

The ACL is a discounted probability-weighted estimate of the cash shortfalls expected to result from defaults over the relevant time horizon. For loan commitments, credit loss estimates consider the portion of the commitment that is expected to be drawn over the relevant time period. For financial guarantees, credit loss estimates are based on the expected payments required under the guarantee contract. For finance lease receivables, credit loss estimates are based on cash flows consistent with the cash flows used in measuring the lease receivable.

Increases or decreases in the required ACL attributable to purchases and new originations, derecognitions or maturities, and remeasurements due to changes in loss expectations or stage transfers are recorded in PCL. Write-offs and recoveries of amounts previously written off are recorded against ACL.

The ACL represents an unbiased estimate of expected credit losses on our financial assets as at the balance sheet date. Judgment is required in making assumptions and estimations when calculating the ACL, including movements between the three stages and the application of forward looking information. The underlying assumptions and estimates may result in changes to the provisions from period to period that significantly affect our results of operations.

Measurement of expected credit losses

Expected credit losses are based on a range of possible outcomes and consider all available reasonable and supportable information including internal and external ratings, historical credit loss experience, and expectations about future cash flows. The measurement of expected credit losses is based primarily on the product of the instrument's probability of default (PD), loss given default (LGD), and exposure at default (EAD) discounted to the reporting date. The main difference between Stage 1 and Stage 2 expected credit losses for performing financial assets is the respective calculation horizon. Stage 1 estimates project PD, LGD and EAD over a maximum period of 12 months while Stage 2 estimates project PD, LGD and EAD over the remaining lifetime of the instrument.

An expected credit loss estimate is produced for each individual exposure. Relevant parameters are modeled on a collective basis using portfolio segmentation that allows for appropriate incorporation of forward looking information. To reflect other characteristics that are not already considered through modelling, expert credit judgment is exercised in determining the final expected credit losses.

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

Expected credit losses are discounted to the reporting period date using the effective interest rate.

Expected life

For instruments in Stage 2 or Stage 3, loss allowances reflect expected credit losses over the expected remaining lifetime of the instrument. For most instruments, the expected life is limited to the remaining contractual life.

An exemption is provided for certain instruments with the following characteristics: (a) the instrument includes both a loan and undrawn commitment component; (b) we have the contractual ability to demand repayment and cancel the undrawn commitment; and (c) our exposure to credit losses is not limited to the contractual notice period. For products in scope of this exemption, the expected life may exceed the remaining contractual life and is the period over which our exposure to credit losses is not mitigated by our normal credit risk management actions. This period varies by product and risk category and is estimated based on our historical experience with similar exposures and consideration of credit risk management actions taken as part of our regular credit review cycle. Products in scope of this exemption include credit cards, overdraft balances and certain revolving lines of credit. Judgment is required in determining the instruments in scope for this exemption and estimating the appropriate remaining life based on our historical experience and credit risk mitigation practices.

Assessment of significant increase in credit risk

The assessment of significant increase in credit risk requires significant judgment. Movements between Stage 1 and Stage 2 are based on whether an instrument's credit risk as at the reporting date has increased significantly relative to the date it was initially recognized. For the purposes of this assessment, credit risk is based on an instrument's lifetime PD, not the losses we expect to incur. The assessment is generally performed at the instrument level.

Our assessment of significant increases in credit risk is performed at least quarterly based on three factors. If any of the following factors indicates that a significant increase in credit risk has occurred, the instrument is moved from Stage 1 to Stage 2:

(1) We have established thresholds for significant increases in credit risk based on both a percentage and absolute change in lifetime PD relative to initial recognition.
(2) Additional qualitative reviews are performed to assess the staging results and make adjustments, as necessary, to better reflect the positions whose credit risk has increased significantly.

(3) Instruments which are 30 days past due are generally considered to have experienced a significant increase in credit risk, even if our other metrics do not indicate that a significant increase in credit risk has occurred.

The thresholds for movement between Stage 1 and Stage 2 are symmetrical. After a financial asset has transferred to Stage 2, if its credit risk is no longer considered to have significantly increased relative to its initial recognition, the financial asset will move back to Stage 1.

For certain instruments with low credit risk as at the reporting date, it is presumed that credit risk has not increased significantly relative to initial recognition. Credit risk is considered to be low if the instrument has a low risk of default, and the borrower has the ability to fulfill their contractual obligations both in the near term and in the longer term, including periods of adverse changes in the economic or business environment. Certain interest-bearing deposits with banks, assets purchased under reverse repurchase agreements, insurance policy loans, and liquidity facilities extended to our multi-seller conduits have been identified as having low credit risk.

Use of forward-looking information

The measurement of expected credit losses for each stage and the assessment of significant increase in credit risk considers information about past events and current conditions as well as reasonable and supportable projections of future events and economic conditions. The estimation and application of forward-looking information requires significant judgment.

The PD, LGD and EAD inputs used to estimate Stage 1 and Stage 2 credit loss allowances are modelled based on the macroeconomic variables (or changes in macroeconomic variables) that are most closely correlated with credit losses in the relevant portfolio. Each macroeconomic scenario used in our expected credit loss calculation includes a projection of all relevant macroeconomic variables used in our models for a five year period, subsequently reverting to long-run averages. Macroeconomic variables used in our expected credit loss models include, but are not limited to, unemployment rates, gross domestic product growth rates, commodity prices, and Canadian housing prices. Depending on their usage in the models, macroeconomic variables may be projected at a country, province/state or more granular level.

Our estimation of expected credit losses in Stage 1 and Stage 2 is a discounted probability-weighted estimate that considers a minimum of three future macroeconomic scenarios. Our base case scenario is based on macroeconomic forecasts published by our internal economics group. Upside and downside scenarios vary relative to our base case scenario based on reasonably possible alternative macroeconomic conditions. Additional and more severe downside scenarios are designed to capture a broader range of potential credit losses in certain sectors. Scenario design, including the identification of additional downside scenarios, occurs at least on an annual basis and more frequently if conditions warrant.

Scenarios are designed to capture a wide range of possible outcomes and weighted according to our best estimate of the relative likelihood of the range of outcomes that each scenario represents. Scenario weights take into account historical frequency, current trends, and forward-looking conditions and are updated on a quarterly basis. All scenarios considered are applied to all portfolios subject to expected credit losses with the same probabilities.

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

Definition of default

The definition of default used in the measurement of expected credit losses is consistent with the definition of default used for our internal credit risk management purposes. Our definition of default may differ across products and consider both quantitative and qualitative factors, such as the terms of financial covenants and days past due. For retail and wholesale borrowers, except as detailed below, default occurs when the borrower is more than 90 days past due on any material obligation to us, and/or we consider the borrower unlikely to make their payments in full without recourse action on our part, such as taking formal possession of any collateral held. For certain credit card balances, default occurs when payments are 180 days past due. For these balances, the use of a period in excess of 90 days past due is reasonable and supported by observable data on write-off and recovery rates experienced on historical credit card portfolios. The definition of default used is applied consistently from period to period and to all financial instruments unless it can be demonstrated that circumstances have changed such that another definition of default is more appropriate.

Credit-impaired financial assets (Stage 3)

Financial assets are assessed for credit-impairment at each balance sheet date and more frequently when circumstances warrant further assessment. Evidence of credit-impairment may include indications that the borrower is experiencing significant financial difficulty, probability of bankruptcy or other financial reorganization, as well as a measurable decrease in the estimated future cash flows evidenced by the adverse changes in the payments status of the borrower or economic conditions that correlate with defaults. An asset that is in Stage 3 will move back to Stage 2 when, as at the reporting date, it is no longer considered to be credit-impaired. The asset will transfer back to Stage 1 when its credit risk at the reporting date is no longer considered to have increased significantly from initial recognition, which could occur during the same reporting period as the transfer from Stage 3 to Stage 2.

When a financial asset has been identified as credit-impaired, expected credit losses are measured as the difference between the asset's gross carrying amount and the present value of estimated future cash flows discounted at the instrument's original effective interest rate. For impaired financial assets with drawn and undrawn components, expected credit losses also reflect any credit losses related to the portion of the loan commitment that is expected to be drawn down over the remaining life of the instrument.

When a financial asset is credit-impaired, interest ceases to be recognized on the regular accrual basis, which accrues income based on the gross carrying amount of the asset. Rather, interest income is calculated by applying the original effective interest rate to the amortized cost of the asset, which is the gross carrying amount less the related ACL. Following impairment, interest income is recognized on the unwinding of the discount from the initial recognition of impairment.

ACL for credit-impaired loans in Stage 3 are established at the borrower level, where losses related to impaired loans are identified on individually significant loans, or collectively assessed and determined through the use of portfolio-based rates, without reference to particular loans.

Individually assessed loans (Stage 3)

When individually significant loans are identified as impaired, we reduce the carrying value of the loans to their estimated realizable value by recording an individually assessed ACL to cover identified credit losses. The individually assessed ACL reflects the expected amount of principal and interest calculated under the terms of the original loan agreement that will not be recovered, and the impact of time delays in collecting principal and/or interest (time value of money). The estimated realizable value for each individually significant loan is the present value of expected future cash flows discounted using the original effective interest rate for each loan. When the amounts and timing of future cash flows cannot be estimated with reasonable reliability, the estimated realizable amount may be determined using observable market prices for comparable loans, the fair value of collateral underlying the loans, and other reasonable and supported methods based on management judgment.

Individually-assessed allowances are established in consideration of a range of possible outcomes, which may include macroeconomic or non-macroeconomic scenarios, to the extent relevant to the circumstances of the specific borrower being assessed. Assumptions used in estimating expected future cash flows reflect current and expected future economic conditions and are generally consistent with those used in Stage 1 and Stage 2 measurement.

Significant judgment is required in assessing evidence of credit-impairment and estimation of the amount and timing of future cash flows when determining expected credit losses. Changes in the amount expected to be recovered would have a direct impact on PCL and may result in a change in the ACL.

Collectively assessed loans (Stage 3)
Loans that are collectively assessed are grouped on the basis of similar risk characteristics, taking into account loan type, industry, geographic location, collateral type, past due status and other relevant factors.

The collectively-assessed ACL reflects: (i) the expected amount of principal and interest calculated under the terms of the original loan agreement that will not be recovered, and (ii) the impact of time delays in collecting principal and/or interest (time value of money).

The expected principal and interest collection is estimated on a portfolio basis and references historical loss experience of comparable portfolios with similar credit risk characteristics, adjusted for the current environment and expected future conditions. A portfolio specific coverage ratio is applied against the impaired loan balance in determining the collectively-assessed ACL. The time value of money component is calculated by using the discount factors applied to groups of loans sharing common characteristics. The discount factors represent the expected recovery pattern of the comparable group of loans, and reflect the historical experience of these groups adjusted for current and expected future economic conditions and/or industry factors. Significant judgment is required in assessing evidence of impairment and estimation of the amount and timing of future cash flows when determining expected credit losses. Changes in the amount expected to be recovered would have a direct impact on PCL and may result in a change in the ACL.

Write-off of loans
Loans and the related ACL are written off, either partially or in full, when there is no realistic prospect of recovery. Where loans are secured, they are generally written off after receipt of any proceeds from the realization of collateral. In circumstances where the net realizable value of any collateral has been determined and there is no reasonable expectation of further recovery, write off may be earlier. For credit cards, the balances and related allowance for credit losses are generally written off when payment is 180 days past due. Personal loans are generally written off at 150 days past due.

Modifications
The original terms of a financial asset may be renegotiated or otherwise modified, resulting in changes to the contractual terms of the financial asset that affect the contractual cash flows. The treatment of such modifications is primarily based on the process undertaken to execute the renegotiation and the nature and extent of changes expected to result. Modifications which are performed for credit reasons, primarily related to troubled debt restructurings, are generally treated as modifications of the original financial asset. Modifications which are performed for other than credit reasons are generally considered to be an expiry of the original cash flows; accordingly, such renegotiations are treated as a derecognition of the original financial asset and recognition of a new financial asset.

If a modification of terms does not result in derecognition of the financial asset, the carrying amount of the financial asset is recalculated as the present value of the renegotiated or modified contractual cash flows, discounted at the original effective interest rate and a gain or loss is recognized. The financial asset continues to be subject to the same assessments for significant increase in credit risk relative to initial recognition and credit-impairment, as described above. A modified financial asset will transfer out of Stage 3 if the conditions that led to it being identified as credit-impaired are no longer present and relate objectively to an event occurring after the original credit-impairment was recognized. A modified financial asset will transfer out of Stage 2 when it no longer satisfies the relative thresholds set to identify significant increases in credit risk, which are based on changes in its lifetime PD, days past due and other qualitative considerations. The financial asset continues to be monitored for significant increases in credit risk and credit-impairment.

If a modification of terms results in derecognition of the original financial asset and recognition of the new financial asset, the new financial asset will generally be recorded in Stage 1, unless it is determined to be credit-impaired at the time of the renegotiation. For the purposes of assessing for significant increases in credit risk, the date of initial recognition for the new financial asset is the date of the modification.

Derivatives (IFRS 9)
When derivatives are embedded in other financial instruments or host contracts, such combinations are known as hybrid instruments. Some of the cash flows of a hybrid instrument vary in a way similar to a stand-alone derivative. If the host contract is a financial asset within the scope of IFRS 9, the classification and measurement criteria are applied to the entire hybrid instrument as described in the Classification of financial assets section of Note 2. If the host contract is a financial liability or an asset that is not within the scope of IFRS 9, embedded derivatives are separately recognized if the economic characteristics and risks of the embedded derivative are not clearly and closely related to the host contract, unless an election has been made to elect the fair value option, as described above. The host contract is accounted for in accordance with the relevant standards.

Policies applicable prior to November 1, 2017 (IAS 39)

Securities (IAS 39)
Securities are classified at inception, based on management's intention, as fair value through profit or loss (FVTPL), available-for-sale (AFS) or held-to-maturity. Certain debt securities with fixed or determinable payments and which are not quoted in an active market may be classified as loans and receivables.

Trading securities include securities purchased for sale in the near term which are classified as FVTPL by nature and securities designated as FVTPL under the fair value option. Obligations to deliver trading securities sold but not yet purchased are recorded as liabilities and carried at fair value. Realized and unrealized gains and losses on these securities are generally recorded as Trading revenue in Non-interest income. Dividends and interest income accruing on Trading securities are recorded in Interest income. Interest and dividends accrued on interest-bearing and equity securities sold short are recorded in Interest expense.

AFS securities include: (i) securities which may be sold to meet liquidity needs, in response to or in anticipation of changes in interest rates and resulting prepayment risk, changes in foreign currency risk, changes in funding sources or terms, and (ii) loan substitute securities which are client financings that have been structured as after-tax investments rather than conventional loans in order to provide the clients with a borrowing rate advantage. AFS securities are measured at fair value. Unrealized gains and losses arising from changes in fair value are recorded in OCI. Changes in foreign exchange rates for AFS equity securities are recognized in Other components of equity, while changes in foreign exchange rates for AFS debt securities are recognized in Foreign exchange revenue, other than trading in Non-interest income. When the security is sold, the cumulative gain or loss recorded in Other components of equity is included as Net gains on AFS securities in Non-interest income. Purchase premiums or discounts on AFS debt securities are amortized over the life of the security using the effective interest method and are recognized in Net interest income. Dividends and interest income accruing on AFS securities are recorded in Interest income.

At each reporting date, and more frequently when conditions warrant, we evaluate our AFS securities to determine whether there is any objective evidence of impairment. Such evidence includes: for debt instruments, when an adverse effect on future cash flows from the asset or group of assets can be reliably estimated; for equity securities, when there is a significant or prolonged decline in the fair value of the investment below its cost.

When assessing debt instruments for impairment, we primarily consider counterparty ratings and security-specific factors, including subordination, external ratings, and the value of any collateral held for which there may not be a readily accessible market. Significant judgment is required in assessing impairment as management is required to consider all available evidence in determining whether objective evidence of impairment exists and whether the principal and interest on the AFS debt security can be fully recovered. For complex debt instruments we use cash flow projection models which incorporate actual and projected cash flows for each security based on security-specific factors using a number of assumptions and inputs that involve management judgment, such as default, prepayment and recovery rates. Due to the subjective nature of choosing these inputs and assumptions, the actual amount of the future cash flows and their timing may differ from the estimates used by management and consequently may cause a different conclusion as to the recognition of impairment or measurement of impairment losses.

When assessing equity securities for impairment, we consider factors which include the length of time and extent the fair value has been below cost, along with management's assessment of the financial condition, business and other risks of the issuer. Management weighs all these factors to determine the impairment but to the extent that management judgment may differ from the actual experience of the timing and amount of the recovery of the fair value, the estimate for impairment could change from period to period based upon future events that may or may not occur, and the conclusion for the impairment of the equity securities may differ.

If an AFS security is impaired, the cumulative unrealized loss previously recognized in Other components of equity is removed from equity and recognized in Net gains on AFS securities under Non-interest income. This amount is determined as the difference between the cost/amortized cost and current fair value of the security less any impairment loss previously recognized. Subsequent to impairment, further declines in fair value are recorded in Non-interest income, while increases in fair value are recognized in Other components of equity until sold. For AFS debt securities, reversal of previously recognized impairment losses is recognized in our Consolidated Statements of Income if the recovery is objectively related to a specific event occurring after recognition of the impairment loss.

Held-to-maturity securities are debt securities where we have the intention and the ability to hold the investment until its maturity date. These securities are initially recorded at fair value and are subsequently measured at amortized cost using the effective interest method, less any impairment losses which we assess using the same impairment model as loans. Interest income and amortization of premiums and discounts on debt securities are recorded in Net interest income. For held-to-maturity securities, reversal of previously recognized impairment losses is recognized in our Consolidated Statements of Income if the recovery is objectively related to a specific event occurring after the recognition of the impairment loss. Reversals of impairment losses on held-to-maturity securities are recorded to a maximum of what the amortized cost of the investment would have been, had the impairment not been recognized at the date the impairment is reversed. Held-to-maturity securities have been included with AFS securities on our Consolidated Balance Sheets.

We account for all of our securities using settlement date accounting and changes in fair value between the trade date and settlement date are reflected in income for securities classified or designated as FVTPL, and changes in the fair value of AFS securities between the trade and settlement dates are recorded in OCI except for changes in foreign exchange rates on debt securities, which are recorded in Non-interest income.

Fair value option (IAS 39)

A financial instrument can be designated as FVTPL (the fair value option) on its initial recognition. An instrument that is designated as FVTPL by way of this fair value option must have a reliably measurable fair value and satisfy one of the following criteria: (i) it eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise from measuring assets or liabilities, or recognizing gains and losses on them on a different basis (an accounting mismatch); (ii) it belongs to a group of financial assets or financial liabilities or both that are managed, evaluated, and reported to key management personnel on a fair value basis in accordance with our risk management strategy, and we can demonstrate that significant financial risks are eliminated or significantly reduced; or (iii) there is an embedded derivative in the financial or non-financial host contract and the derivative is not closely related to the host contract. These instruments cannot be reclassified out of the FVTPL category while they are held or issued.

Financial assets designated as FVTPL are recorded at fair value and any unrealized gain or loss arising due to changes in fair value is included in Trading revenue or Non-interest income – Other. Financial liabilities designated as FVTPL are recorded at fair value and fair value changes attributable to changes in our own credit risk are recorded in OCI. Amounts recognized in OCI will not be reclassified subsequently to net income. The remaining fair value changes are recorded in Trading revenue or Non-interest income – Other. Upon initial recognition, if we determine that presenting the effects of own credit risk changes in OCI would create or enlarge an accounting mismatch in net income, the full fair value change in our debt designated as FVTPL is recognized in net income.

To determine the fair value adjustments on our debt designated as FVTPL, we calculate the present value of the instruments based on the contractual cash flows over the term of the arrangement by using our effective funding rate at the beginning and end of the period with the change in present value recorded in OCI, Trading revenue or Non-interest income – Other as appropriate.

Loans (IAS 39)

Loans are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market and which are not classified as AFS. Loans are initially recognized at fair value. When loans are issued at a market rate, fair value is represented by the cash advanced to the borrowers. Loans are subsequently measured at amortized cost using the effective interest method less impairment, unless we intend to sell them in the near future upon origination or they have been designated as FVTPL, in which case they are carried at fair value.

We assess our loans (including debt securities classified as loans) for objective evidence of impairment at each balance sheet date. Evidence of impairment may include indications that the borrower is experiencing significant financial difficulty, probability of bankruptcy or other financial reorganization, as well as a measurable decrease in the estimated future cash flows evidenced by the adverse changes in the payments status of the borrower or economic conditions that correlate with defaults. Whenever a payment is 90 days past due, loans other than certain credit card balances and loans guaranteed or insured by a Canadian government (Federal or Provincial) or a Canadian government agency (collectively, Canadian government) are classified as impaired unless they are fully secured and collection efforts are reasonably expected to result in repayment of debt within 180 days of the loans becoming past due. Loans guaranteed by a Canadian government are classified as impaired when the loan is contractually 365 days in arrears. Credit card balances are generally classified as impaired when a payment is 180 days in arrears.

Assets acquired to satisfy loan commitments are recorded at their fair value less costs to sell. Fair value is determined based on either current market value where available or discounted cash flows. Any excess of the carrying value of the loan over the fair value of the assets acquired is recognized by a charge to Provision for credit losses.

Interest on loans is recognized in Interest income – Loans using the effective interest method. The estimated future cash flows used in this calculation include those determined by the contractual term of the asset, all fees that are considered to be integral to the effective interest rate, transaction costs and all other premiums or discounts. Fees that relate to activities such as originating, restructuring or renegotiating loans are deferred and recognized as Interest income over the expected term of such loans using the effective interest method. Where there is a reasonable expectation that a loan will be originated, commitment and standby fees are also recognized as interest income over the expected term of the resulting loans using the effective interest method. Otherwise, such fees are recorded as Other Liabilities and amortized into Non-interest income over the commitment or standby period. Prepayment fees on mortgage loans are not included as part of the effective interest rate at origination as the amounts are not reliably measurable. If prepayment fees are received on a renewal of a mortgage loan, the fee is included as part of the effective interest rate, and if not renewed, the prepayment fee is recognized in interest income at the prepayment date.

Allowance for credit losses (IAS 39)

An allowance for credit losses is established if there is objective evidence that we will be unable to collect all amounts due on our loans portfolio according to the original contractual terms or the equivalent value. 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.

The allowance for credit losses is increased by the impairment losses recognized and decreased by the amount of write-offs, net of recoveries. The allowance for credit losses for on-balance sheet items is included as a reduction to assets, and the allowance for credit losses relating to off-balance sheet items is included in Provisions under Other Liabilities.

We assess whether objective evidence of impairment exists individually for loans that are individually significant and collectively for loans that are not individually significant. If we determine that no objective evidence of impairment exists for an individually assessed loan, whether significant or not, the loan is included in a group of loans with similar credit risk characteristics and collectively assessed for impairment. Loans that are individually assessed for impairment and for which an impairment loss is recognized are not included in a collective assessment of impairment.

Allowance for credit losses represent management's best estimates of losses incurred in our loan portfolio at the balance sheet date. Management's judgment is required in making assumptions and estimations when calculating allowances on both individually and collectively assessed loans. The underlying assumptions and estimates used for both individually and collectively assessed loans can change from period to period and may significantly affect our results of operations.

Individually assessed loans

Loans which are individually significant are assessed individually for objective indicators of impairment. A loan is considered impaired when we determine that we will not be able to collect all amounts due according to the original contractual terms 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. Individually-assessed impairment losses reduce the carrying amount of the loan through the use of an allowance account and the amount of the loss is recognized in Provision for credit losses in our Consolidated Statements of Income. Following impairment, interest income is recognized on the unwinding of the discount from the initial recognition of impairment.

Significant judgment is required in assessing evidence of impairment and estimation of the amount and timing of future cash flows when determining the impairment loss. When assessing objective evidence of impairment we primarily consider specific factors such as the financial condition of the borrower, the borrower's default or delinquency in interest or principal payments, local economic conditions and other observable data. In determining the estimated recoverable amount we consider discounted expected future cash flows at the effective interest rate using a number of assumptions and inputs. Management judgment is involved when choosing these inputs and assumptions used such as the expected amount of the loan that will not be recovered and the cost of time delays in collecting principal and/or interest, and when estimating the value of any collateral held for which there may not be a readily accessible market. Changes in the amount expected to be recovered would have a direct impact on the Provision for credit losses and may result in a change in the Allowance for credit losses.

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 with 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. Collectively-assessed impairment losses reduce the carrying amount of the aggregated loan position through an allowance account and the amount of the loss is recognized in Provision for credit losses. Following impairment, interest income is recognized on the unwinding of the discount from the initial recognition of impairment.

The methodology and assumptions used to calculate collective impairment allowances are subject to uncertainty, in part because it is not practicable to identify losses on an individual loan basis due to the large number of individually insignificant loans in the portfolio. Significant judgment is required in assessing historical loss experience, the loss identification period and its relationship to current portfolios including delinquency, and loan balances; and current business, economic and credit conditions including industry specific performance, unemployment and country risks. Changes in these assumptions would have a direct impact on the Provision for credit losses and may result in changes in the related Allowance for credit losses.

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 generally written off when payment is 180 days in arrears. Personal loans are generally written off at 150 days past due, except for loans guaranteed or insured by a Canadian government or Canadian government agency, which are written off when the loan is contractually 365 days in arrears.

Derivatives (IAS 39)
When derivatives are embedded in other financial instruments or host contracts, such combinations are known as hybrid instruments with the effect that some of the cash flows of a hybrid instrument vary in a way similar to a stand-alone derivative. If the host contract is not carried at fair value with changes in fair value reported in our Consolidated Statements of Income, the embedded derivative is generally required to be separated from the host contract and accounted for separately as at FVTPL if the economic characteristics and risks of the embedded derivative are not closely related to those of the host contract. All embedded derivatives are presented on a combined basis with the host contracts although they are separated for measurement purposes when conditions requiring separation are met.

Impact of adoption of IFRS 9
Mandatory reclassifications
The combined application of the business model and SPPI tests on adoption of IFRS 9 resulted in the reclassification of the following financial assets and liabilities.

	IFRS 9		IAS 39	
	As at			
	November 1, 2017		October 31, 2017	
(Millions of Canadian dollars)	Measurement category	Carrying amount	Previous measurement category	Carrying amount
Financial assets:				
Trading securities (1)	**FVTPL**	**$ 2,572**	Available-for-sale	$ 2,572
Trading securities (2)	**FVTPL**	**398**	Loans and receivables	398
Investment securities (3)	**Amortized cost**	**23,602**	Available-for-sale	23,473
Assets purchased under reverse repurchase agreements and securities borrowed (4)	**FVTPL**	**11,720**	Loans and receivables	11,720
Loans (2)	**FVTPL**	**380**	Loans and receivables	405
Loans (5)	**FVOCI**	**547**	Loans and receivables	540
Financial liabilities:				
Other				
Obligations related to assets sold under repurchase agreements and securities loaned (4)	**FVTPL (designated)**	**$ 2,534**	Amortized cost	$ 2,534

(1) $833 million of equity securities previously classified as available-for-sale were reclassified to FVTPL by nature. $1,739 million of debt securities previously classified as available-for-sale whose cash flows are not solely payments of principal or interest were reclassified to FVTPL.
(2) Loans and securities whose cash flows are not solely payments of principal or interest were reclassified to FVTPL.
(3) Debt securities managed within a HTC business model were reclassified from available-for-sale to amortized cost. As at October 31, 2018, the fair value of these securities was $17,870 million. For the year ended October 31, 2018, $271 million of losses would have been recognized in OCI if the securities had not been reclassified.
(4) Assets purchased under reverse repurchase agreements and securities borrowed previously classified as loans and receivables were reclassified to FVTPL as they are managed on a fair value basis. Obligations related to assets sold under repurchase agreements and securities loaned, previously measured at amortized cost, were designated as FVTPL as they are similarly managed on a fair value basis.
(5) Loans managed under a business model to HTC&S were reclassified to FVOCI.

Items previously designated as FVTPL
The following financial assets previously designated as FVTPL were classified as FVTPL by nature because the assets are managed on a fair value basis or FVOCI as they are managed under a business model to HTC&S.

	IFRS 9		IAS 39	
	As at			
	November 1, 2017		October 31, 2017	
(Millions of Canadian dollars)	Measurement category	Carrying amount	Previous Measurement category	Carrying amount
Financial assets:				
Investment securities	**FVOCI**	**$ 18**	FVTPL (designated)	$ 18
Trading securities	**FVTPL**	**4,291**	FVTPL (designated)	4,291
Assets purchased under reverse repurchase agreements and securities borrowed	**FVTPL**	**138,979**	FVTPL (designated)	138,979
Loans	**FVTPL**	**2,296**	FVTPL (designated)	2,296
Other assets	**FVTPL**	**1,212**	FVTPL (designated)	1,212

Optional designations

In conjunction with the classification changes required by IFRS 9, the following optional designations have been made on transition to IFRS 9.

(Millions of Canadian dollars)	IFRS 9 – As at November 1, 2017 – Measurement category	IFRS 9 – As at November 1, 2017 – Carrying amount	IAS 39 – As at October 31, 2017 – Previous measurement category	IAS 39 – As at October 31, 2017 – Carrying amount
Financial assets:				
Investment securities (1)	**FVOCI (designated)**	**$ 384**	Available for sale	$ 384
Loans (2)	**FVTPL (designated)**	**1,368**	Loans and receivables	1,263
Financial liabilities:				
Deposits (3)	**FVTPL (designated)**	**$ 295**	Amortized cost	$ 324

(1) Certain equity securities that are not held for trading purposes have been designated as FVOCI.
(2) Loans in our insurance business were designated as FVTPL to address an accounting mismatch with the related liabilities.
(3) Certain deposits were designated as FVTPL to address an accounting mismatch with the related loans, which were reclassified to FVTPL because their cash flows are not solely payments of principal or interest.

Other

The following table presents other changes resulting from the adoption of IFRS 9.

(Millions of Canadian dollars)	IFRS 9 – As at November 1, 2017 – Measurement category	IFRS 9 – As at November 1, 2017 – Carrying amount	IAS 39 – As at October 31, 2017 – Previous measurement category	IAS 39 – As at October 31, 2017 – Carrying amount
Financial assets:				
Investment securities (1)	**Amortized cost**	**$ 7,220**	Loans and receivables	$ 7,232
Investment securities (1)	**Amortized cost**	**14,665**	Held to maturity	14,845

(1) Prior to the adoption of IFRS 9, certain financial assets were reclassified from available-for-sale to held-to-maturity or loans and receivables. Upon adoption of IFRS 9, these financial assets were remeasured as if they had always been carried at amortized cost and reclassified to Investment Securities.

Balance sheet presentation

On November 1, 2017, the balance sheet line item under Securities previously titled Available for sale was re-named to 'Investment'. Investment securities represent all securities other than those measured at FVTPL, which are presented as Trading. For comparative periods, Investment securities represent securities previously classified as available-for-sale and held-to-maturity under IAS 39. For the current period, Investment securities represent securities classified as FVOCI and amortized cost under IFRS 9.

Allowance for credit losses

The following table is a comparison of impairment allowances determined in accordance with IAS 39 and IAS 37 to the corresponding impairment allowance determined in accordance with IFRS 9 as at November 1, 2017.

(Millions of Canadian dollars)	IAS 39 / IAS 37 as at October 31, 2017 – Collectively assessed (1)	Individually assessed	Total	Transition Adjustments	**IFRS 9 as at November 1, 2017 – Stage 1**	**Stage 2**	**Stage 3**	**Total**
Debt securities at fair value through other comprehensive income (2) (3)	$ –	$ –	$ –	$ 25	**$ 3**	**$ 22**	**$ –**	**$ 25**
Debt securities at amortized cost (4)	–	–	–	54	**9**	**45**	**–**	**54**
Assets purchased under reverse repurchase agreements and securities borrowed at amortized cost	–	–	–	1	**1**	**–**	**–**	**1**
Loans at amortized cost	1,855	304	2,159	590	**845**	**1,184**	**720**	**2,749**
Customer liability under acceptances at amortized cost	–	–	–	20	**15**	**5**	**–**	**20**
Other assets at amortized cost	–	–	–	1	**–**	**1**	**–**	**1**
Off-balance sheet loan commitments and financial guarantees	91	–	91	143	**104**	**130**	**–**	**234**
Total allowance for credit losses	$ 1,946	$ 304	$ 2,250	$ 834	**$ 977**	**$ 1,387**	**$ 720**	**$ 3,084**

(1) Includes the allowance for loans not yet identified as impaired and collectively-assessed allowances for impaired loans.
(2) The allowance for credit losses on financial assets at FVOCI is presented in Other components of equity.
(3) Previously available-for-sale debt securities under IAS 39.
(4) Previously held-to-maturity securities under IAS 39.

The table below provides the reconciliations from IAS 39 to IFRS 9 for our Consolidated Balance Sheets, showing separately the impacts of adopting the IFRS 9 impairment, and classification and measurement, requirements. The related tax impacts are included in Other assets – Other.

Consolidated Balance Sheets

(Millions of Canadian Dollars)	As at October 31, 2017 IAS 39	Impact of classification and measurement	Impact of impairment	Total Impact	As at November 1, 2017 IFRS 9
Assets					
Cash and due from banks	$ 28,407	$ –	$ –	$ –	$ 28,407
Interest-bearing deposits with banks	32,662	–	–	–	32,662
Securities					
Trading	127,657	2,952	–	2,952	130,609
Investment, net of applicable allowance	90,722	4,615	(54)	4,561	95,283
	218,379	7,567	(54)	7,513	225,892
Assets purchased under reverse repurchase agreements and securities borrowed	220,977	–	(1)	(1)	220,976
Loans					
Retail	385,170	(8)	–	(8)	385,162
Wholesale	159,606	(7,535)	8	(7,527)	152,079
	544,776	(7,543)	8	(7,535)	537,241
Allowance for loan losses	(2,159)	–	(590)	(590)	(2,749)
Segregated fund net assets	1,216	–	–	–	1,216
Other					
Customers' liability under acceptances	16,459	–	(20)	(20)	16,439
Derivatives	95,023	–	–	–	95,023
Premises and equipment	2,670	–	–	–	2,670
Goodwill	10,977	–	–	–	10,977
Other intangibles	4,507	–	–	–	4,507
Other assets	38,959	(1)	217	216	39,175
	168,595	(1)	197	196	168,791
Total Assets	$ 1,212,853	$ 23	$ (440)	$ (417)	$ 1,212,436
Liabilities					
Deposits					
Personal	$ 260,213	$ –	$ –	$ –	$ 260,213
Business and government	505,665	(29)	–	(29)	505,636
Bank	23,757	–	–	–	23,757
	789,635	(29)	–	(29)	789,606
Segregated fund net liabilities	1,216	–	–	–	1,216
Other					
Acceptances	16,459	–	–	–	16,459
Obligations related to securities sold short	30,008	–	–	–	30,008
Obligations related to assets sold under repurchase agreements and securities loaned	143,084	–	–	–	143,084
Derivatives	92,127	–	–	–	92,127
Insurance claims and policy benefit	9,676	106	–	106	9,782
Other liabilities	46,955	–	143	143	47,098
	338,309	106	143	249	338,558
Subordinated debentures	9,265	–	–	–	9,265
Total liabilities	1,138,425	77	143	220	1,138,645
Equity attributable to shareholders					
Preferred shares	6,413	–	–	–	6,413
Common shares	17,703	–	–	–	17,703
Retained earnings	45,359	44	(602)	(558)	44,801
Other components of equity	4,354	(98)	19	(79)	4,275
	73,829	(54)	(583)	(637)	73,192
Non-controlling interests	599	–	–	–	599
Total equity	74,428	(54)	(583)	(637)	73,791
Total liabilities and equity	$ 1,212,853	$ 23	$ (440)	$ (417)	$ 1,212,436

Policies under both IFRS 9 and IAS 39

Determination of fair value (IFRS 9 and IAS 39)

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

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

We have established policies, procedures and controls for valuation methodologies and techniques to ensure that fair value is reasonably estimated. Major valuation processes and controls include, but are not limited to, profit and loss decomposition, independent price verification (IPV) and model validation standards. These control processes are managed by either Finance or Group Risk Management and are independent of the relevant businesses and their trading functions. Profit and loss decomposition is a process to explain the fair value changes of certain positions and is performed daily for trading portfolios. All fair value instruments are subject to IPV, a process whereby trading function valuations are verified against external market prices and other relevant market data. Market data sources include traded prices, brokers and price vendors. We give priority to those third-party pricing services and prices having the highest and most consistent accuracy. The level of accuracy is determined over time by comparing third-party price values to traders' or system values, to other pricing service values and, when available, to actual trade data. Quoted prices for identical instruments from pricing services or brokers are generally not adjusted unless there are issues such as stale prices. If multiple quotes for identical instruments are received, fair value is based on an average of the prices received or the quote from the most reliable vendor, after the outlier prices that fall outside of the pricing range are removed. Other valuation techniques are used when a price or quote is not available. Some valuation processes use models to determine fair value. We have a systematic and consistent approach to control the use of models. Valuation models are approved for use within our model risk management framework. The framework addresses, among other things, model development standards, validation processes and procedures and approval authorities. Model validation ensures that a model is suitable for its intended use and sets parameters for its use. All models are revalidated regularly by qualified personnel who are independent of the model design and development. Annually our model risk profile is reported to the Board of Directors.

IFRS 13 *Fair Value Measurement* permits an exception, through an accounting policy choice, to measure the fair value of a portfolio of financial instruments on a net open risk position basis when certain criteria are met. We have elected to use this policy choice to determine the fair value of certain portfolios of financial instruments, primarily derivatives, based on a net exposure to market or credit risk.

We record valuation adjustments to appropriately reflect counterparty credit quality of our derivative portfolio, differences between the actual counterparty collateral discount curve and standard overnight index swap (OIS) discounting for collateralized derivatives, funding valuation adjustments (FVA) for uncollateralized and under-collateralized over-the-counter (OTC) derivatives, unrealized gains or losses at inception of the transaction, bid-offer spreads, unobservable parameters and model limitations. These adjustments may be subjective as they require significant judgment in the input selection, such as implied probability of default and recovery rate, and are intended to arrive at a fair value that is determined based on assumptions that market participants would use in pricing the financial instrument. The realized price for a transaction may be different from its recorded value, previously estimated using management judgment. Valuation adjustments may therefore impact unrealized gains and losses recognized in Non-interest income – Trading revenue or Other.

Valuation adjustments are recorded for the credit risk of our derivative portfolios in order to arrive at their fair values. Credit valuation adjustments (CVA) take into account our counterparties' creditworthiness, the current and potential future mark-to-market of transactions and the effects of credit mitigants such as master netting and collateral agreements. CVA amounts are derived from estimates of exposure at default, probability of default, recovery rates on a counterparty basis and market and credit factor correlations. Exposure at default is the value of expected derivative related assets and liabilities at the time of default, estimated through modelling using underlying risk factors. Probability of default is implied from the market prices for credit protection and the credit ratings of the counterparty. When market data is unavailable, it is estimated by incorporating assumptions and adjustments that market participants would use for determining fair value using these inputs. Correlation is the statistical measure of how credit and market factors may move in relation to one another. Correlation is estimated using historical data. CVA is calculated daily and changes are recorded in Non-interest income – Trading revenue.

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

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

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

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

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

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

Derecognition of financial assets (IFRS 9 and IAS 39)
Financial assets are derecognized from our Consolidated Balance Sheets when our contractual rights to the cash flows from the assets have expired, when we retain the rights to receive the cash flows of the assets but assume an obligation to pay those cash flows to a third party subject to certain pass-through requirements or when we transfer our contractual rights to receive the cash flows and substantially all of the risk and rewards of the assets have been transferred. When we retain substantially all of the risks and rewards of the transferred assets, the transferred assets are not derecognized from our Consolidated Balance Sheets and are accounted for as secured financing transactions. When we neither retain nor transfer substantially all risks and rewards of ownership of the assets, we derecognize the assets if control over the assets is relinquished. If we retain control over the transferred assets, we continue to recognize the transferred assets to the extent of our continuing involvement.

Management's judgment is applied in determining whether the contractual rights to the cash flows from the transferred assets have expired or whether we retain the rights to receive cash flows on the assets but assume an obligation to pay for those cash flows. We derecognize transferred financial assets if we transfer substantially all the risks and rewards of the ownership in the assets. When assessing whether we have transferred substantially all of the risk and rewards of the transferred assets, management considers the Bank's exposure before and after the transfer with the variability in the amount and timing of the net cash flows of the transferred assets. In transfers in which we retain the servicing rights, management has applied judgment in assessing the benefits of servicing against market expectations. When the benefits of servicing are greater than fair value, a servicing asset is recognized in Other assets in our Consolidated Balance Sheets. When the benefits of servicing are less than fair value, a servicing liability is recognized in Other liabilities in our Consolidated Balance Sheets.

Derecognition of financial liabilities (IFRS 9 and IAS 39)
We derecognize a financial liability from our Consolidated Balance Sheets when our obligation specified in the contract expires, or is discharged or cancelled. We recognize the difference between the carrying amount of a financial liability transferred and the consideration paid in our Consolidated Statements of Income.

Interest (IFRS 9 and IAS 39)
Interest is recognized in Interest income and Interest expense in the Consolidated Statements of Income for all interest-bearing financial instruments. The effective interest rate is the rate that discounts estimated future cash flows over the expected life of the financial asset or liability to the net carrying amount upon initial recognition. Significant judgment is applied in determining the effective interest rate due to uncertainty in the timing and amounts of future cash flows.

Dividend income (IFRS 9 and IAS 39)
Dividend income is recognized when the right to receive payment is established. This is the ex-dividend date for listed equity securities, and usually the date when shareholders have approved the dividend for unlisted equity securities.

Transaction costs (IFRS 9 and IAS 39)
Transaction costs are expensed as incurred for financial instruments classified or designated as FVTPL. For other financial instruments, transaction costs are capitalized on initial recognition. For financial assets and financial liabilities measured at amortized cost, capitalized transaction costs are amortized through net income over the estimated life of the instrument using the effective interest method. For financial assets measured at FVOCI (AFS financial assets under IAS 39) that do not have fixed or determinable payments and no fixed maturity, capitalized transaction costs are recognized in net income when the asset is derecognized or becomes impaired.

Offsetting financial assets and financial liabilities (IFRS 9 and IAS 39)
Financial assets and financial liabilities are offset on the balance sheet when there exists both a legally enforceable right to offset the recognized amounts and an intention to settle on a net basis, or realize the asset and settle the liability simultaneously.

Assets purchased under reverse repurchase agreements and sold under repurchase agreements (IFRS 9 and IAS 39)
We purchase securities under agreements to resell (reverse repurchase agreements) and take possession of these securities. We monitor the market value of the securities purchased and additional collateral is obtained when appropriate. We have the right to liquidate the collateral held in the event of counterparty default. Reverse repurchase agreements are treated as collateralized lending transactions. We also sell securities under agreements to repurchase (repurchase agreements), which are treated as collateralized borrowing transactions. The securities received under reverse repurchase agreements and securities delivered under repurchase agreements are not recognized on, or derecognized from, our Consolidated Balance Sheets, respectively, unless the risks and rewards of ownership are obtained or relinquished.

Reverse repurchase agreements and repurchase agreements are carried on our Consolidated Balance Sheets at the amounts at which the securities were initially acquired or sold, except when they are classified or designated as FVTPL and are recorded at fair value. Interest earned on reverse repurchase agreements is included in Interest income, and interest incurred on repurchase agreements is included in Interest expense in our Consolidated Statements of Income. Changes in fair value for reverse repurchase agreements and repurchase agreements designated as FVTPL are included in Trading revenue or Other in Non-interest income.

Derivatives (IFRS 9 and IAS 39)
Derivatives are primarily used in trading activities. Derivatives are also used to manage our exposure to interest, currency, credit and other market risks. The most frequently used derivative products are interest rate and foreign exchange swaps, options, futures and forward rate agreements, equity swaps and credit derivatives. All derivative instruments are recorded on our Consolidated Balance Sheets at fair value.

When derivatives are used in trading activities, the realized and unrealized gains and losses on these derivatives are recognized in Trading revenue in Non-interest income. Derivatives with positive fair values are reported as Derivative assets and derivatives with negative fair values are reported as Derivative liabilities. In accordance with our policy for offsetting financial assets and financial liabilities, the net fair value of certain derivative assets and liabilities are reported as an asset or liability, as appropriate. Valuation adjustments are included in the fair value of Derivative assets and Derivative liabilities. Premiums paid and premiums received are shown in Derivative assets and Derivative liabilities, respectively.

When derivatives are used to manage our own exposures, we determine for each derivative whether hedge accounting can be applied, as discussed in the Hedge accounting section below.

Hedge accounting (IFRS 9 and IAS 39)
We have elected to continue to apply the hedge accounting principles under IAS 39 instead of those under IFRS 9.

We use derivatives and non-derivatives in our hedging strategies to manage our exposure to interest rate, currency, credit and other market risks. Where hedge accounting can be applied, a hedge relationship is designated and documented at inception to detail the particular risk management objective and strategy for undertaking the hedge transaction. The documentation identifies the specific asset, liability or anticipated cash flows being hedged, the risk that is being hedged, the type of hedging instrument used and how effectiveness will be assessed. We assess, both at the inception of the hedge and on an ongoing basis, whether the hedging instruments are 'highly effective' in offsetting changes in the fair value or cash flows of the hedged items. A hedge is regarded as highly effective only if the following criteria are met: (i) at inception of the hedge and throughout its life, the hedge is expected to be highly effective in achieving offsetting changes in fair value or cash flows attributable to the hedged risk, and (ii) actual results of the hedge are within a pre-determined range. In the case of hedging a forecast transaction, the transaction must have a high probability of occurring and must present an exposure to variations in cash flows that could ultimately affect the reported net profit or loss. Hedge accounting is discontinued when it is determined that the hedging instrument is no longer effective as a hedge, the hedging instrument or hedged item is terminated or sold, or the forecast transaction is no longer deemed highly probable. Refer to Note 8 for the fair value of derivatives and non-derivative instruments categorized by their hedging relationships, as well as derivatives that are not designated in hedging relationships.

Fair value hedges
In a fair value hedging relationship, the carrying value of the hedged item is adjusted for changes in fair value attributable to the hedged risk and recognized in Non-interest income. Changes in fair value of the hedged item, to the extent that the hedging relationship is effective, are offset by changes in the fair value of the hedging derivative, which are also recognized in Non-interest income. When hedge accounting is discontinued, the carrying value of the hedged item is no longer adjusted and the cumulative fair value adjustments to the carrying value of the hedged items are amortized to Net income over the expected remaining life of the hedged items.

We predominantly use interest rate swaps to hedge our exposure to changes in a fixed interest rate instrument's fair value caused by changes in interest rates.

Cash flow hedges
In a cash flow hedging relationship, the effective portion of the change in the fair value of the hedging derivative, net of taxes, is recognized in OCI while the ineffective portion is recognized in Non-interest income. When hedge accounting is discontinued, the cumulative amounts previously recognized in Other components of equity are reclassified to Net interest income during the periods when the variability in the cash flows of the hedged item affects Net interest income. Unrealized gains and losses on derivatives are reclassified immediately to Net income when the hedged item is sold or terminated early, or when the forecast transaction is no longer expected to occur.

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

Net investment hedges
In hedging our foreign currency exposure to a net investment in a foreign operation, the effective portion of foreign exchange gains and losses on the hedging instruments, net of applicable taxes, is recognized in OCI and the ineffective portion is recognized in Non-interest income. The amounts, or a portion thereof, previously recognized in Other components of equity are recognized in Net income on the disposal, or partial disposal, of the foreign operation.

We use foreign exchange contracts and foreign currency-denominated liabilities to manage our foreign currency exposures to net investments in foreign operations having a functional currency other than the Canadian dollar.

Guarantees (IFRS 9 and IAS 39)
Financial guarantee contracts are contracts that contingently require us to make specified payments (in cash, other assets, our own shares or provision of services) to reimburse the holder for a loss it incurs because a specified debtor fails to make payment when due in accordance with the original or modified terms of a debt instrument. Liabilities are recognized on our Consolidated Balance Sheets at the inception of a guarantee for the fair value of the obligation undertaken in issuing the guarantee. Financial guarantees are subsequently remeasured at the higher of (i) the amount initially recognized less accumulated amortization and (ii) our best estimate of the present value of the expenditure required to settle the present obligation at the end of the reporting period.

If the financial guarantee contract meets the definition of a derivative, it is measured at fair value at each balance sheet date and reported under Derivatives on our Consolidated Balance Sheets.

Insurance and segregated funds
Premiums from long-duration contracts, primarily life insurance, are recognized when due in Non-interest income – Insurance premiums, investment and fee income. Premiums from short-duration contracts, primarily property and casualty, and fees for administrative services are recognized in Insurance premiums, investment and fee income over the related contract period. Unearned premiums of the short-duration contracts, representing the unexpired portion of premiums, are reported in Other liabilities. Investments made by our insurance operations are classified as FVOCI instruments and amortized cost instruments under IFRS 9 (previously classified as AFS securities under IAS 39 and loans and receivables), except for investments supporting the policy benefit liabilities on life and health insurance contracts and a portion of property and casualty contracts. These are designated as FVTPL with changes in fair value reported in Insurance premiums, investment and fee income.

Insurance claims and policy benefit liabilities represent current claims and estimates for future insurance policy benefits. Liabilities for life insurance contracts are determined using the Canadian Asset Liability Method (CALM), which incorporates assumptions for mortality, morbidity, policy lapses and surrenders, investment yields, policy dividends, operating and policy maintenance expenses and provisions for adverse deviation. These assumptions are reviewed at least annually and updated in response to actual experience and market conditions. Liabilities for property and casualty insurance represent estimated provisions for reported and unreported claims. Liabilities for life and property and casualty insurance are included in Insurance claims and policy benefit liabilities. Changes in Insurance claims and policy benefit liabilities are included in the Insurance policyholder benefits, claims and acquisition expense in our Consolidated Statements of Income in the period in which the estimates change.

Premiums ceded for reinsurance and reinsurance recoveries on policyholder benefits and claims incurred are reported in income and expense as appropriate. Reinsurance recoverables, which relate to paid benefits and unpaid claims, are included in Other assets.

Acquisition costs for new insurance contracts consist of commissions, premium taxes, certain underwriting costs and other costs that vary with the acquisition of new contracts. Deferred acquisition costs for life insurance products are implicitly recognized in Insurance claims and policy benefit liabilities by CALM. For property and casualty insurance, these costs are classified as Other assets and amortized over the policy term.

Segregated funds are lines of business in which we issue an insurance contract where the benefit amount is directly linked to the market value of the investments held in the underlying fund. The contractual arrangement is such that the underlying segregated fund assets are registered in our name but the segregated fund policyholders bear the risks and rewards of the funds' investment performance. Liabilities for these contracts are calculated based on contractual obligations using actuarial assumptions and are at least equivalent to the surrender or transfer value calculated by reference to the value of the relevant underlying funds or indices. Segregated funds' assets and liabilities are separately presented on our Consolidated Balance Sheets. As the segregated fund policyholders bear the risks and rewards of the funds' performance, investment income earned by the segregated funds and expenses incurred by the segregated funds are offset and are not separately presented in our Consolidated Statements of Income. Fee income we earn from segregated funds includes management fees, mortality, policy administration and surrender charges, and these fees are recorded in Non-interest income – Insurance premiums, investment and fee income. We provide minimum death benefit and maturity value guarantees on segregated funds. The liability associated with these minimum guarantees is recorded in Insurance claims and policy benefit liabilities.

Liability adequacy tests are performed for all insurance contract portfolios at each balance sheet date to ensure the adequacy of insurance contract liabilities. Current best estimates of future contractual cash flows, claims handling and administration costs, and investment returns from the assets backing the liabilities are taken into account in the tests. When the test results indicate that there is a deficiency in liabilities, the deficiency is charged immediately to our Consolidated Statements of Income by writing down the deferred acquisition costs in Other assets and/or increasing Insurance claims and policy benefit liabilities.

Employee benefits – Pensions and other post-employment benefits

Our defined benefit pension expense, which is included in Non-interest expense – Human resources, consists of the cost of employee pension benefits for the current year's service, net interest on the net defined benefit liability (asset), past service cost and gains or losses on settlement. Remeasurements of the net defined benefit obligation, which comprise actuarial gains and losses and return on plan assets (excluding amounts included in net interest on the net defined benefit liability), are recognized immediately in OCI in the period in which they occur. Actuarial gains and losses comprise experience adjustments (the effects of differences between the previous actuarial assumptions and what has actually occurred), as well as the effects of changes in actuarial assumptions. Amounts recognized in OCI will not be reclassified subsequently to net income. Past service cost is the change in the present value of the defined benefit obligation resulting from a plan amendment or curtailment and is charged immediately to income.

For each defined benefit pension plan, we recognize the present value of our defined benefit obligations less the fair value of the plan assets as a defined benefit liability reported in Other liabilities – Employee benefit liabilities on our Consolidated Balance Sheets. For plans where there is a net defined benefit asset, the amount is reported as an asset in Other assets – Employee benefit assets on our Consolidated Balance sheets.

The calculation of defined benefit expenses and obligations requires significant judgment as the recognition is dependent on discount rates and various actuarial assumptions such as healthcare cost trend rates, projected salary increases, retirement age and mortality and termination rates. Due to the long-term nature of these plans, such estimates and assumptions are subject to inherent risks and uncertainties. For our pension and other post-employment benefit plans, the discount rate is determined by reference to market yields on high quality corporate bonds. Since the discount rate is based on currently available yields, and involves management's assessment of market liquidity, it is only a proxy for future yields. Actuarial assumptions, set in accordance with current practices in the respective countries of our plans, may differ from actual experience as country specific statistics are only estimates of future employee behaviour. These assumptions are determined by management and are reviewed by actuaries at least annually. Changes to any of the above assumptions may affect the amounts of benefits obligations, expenses and remeasurements that we recognize.

Our contributions to defined contribution pension plans are expensed when employees have rendered services in exchange for such contributions. Defined contribution pension expense is included in Non-interest expense – Human resources.

Share-based compensation

We offer share-based compensation plans to certain key employees and to our non-employee directors.

To account for stock options granted to employees, compensation expense is recognized over the applicable vesting period with a corresponding increase in equity. Fair value is determined by using option valuation models, which take into account the exercise price of the option, the current share price, the risk free interest rate, the expected volatility of the share price over the life of the option and other relevant factors. When the options are exercised, the exercise price proceeds together with the amount initially recorded in equity are credited to common shares. Our other share-based compensation plans include performance deferred share plans and deferred share unit plans for key employees (the Plans). The obligations for the Plans are accrued over their vesting periods. The Plans are settled in cash.

For cash-settled awards, our accrued obligations are adjusted to their fair value at each balance sheet date. For share-settled awards, our expected obligations recognized in equity are based on the fair value of our common shares at the date of grant. Changes in our obligations, net of related hedges, are recorded as Non-interest expense – Human resources in our Consolidated Statements of Income with a corresponding increase in Other liabilities for cash-settled awards and in Retained earnings for share-settled awards. Compensation expense is recognized in the year the awards are earned by plan participants based on the vesting schedule of the relevant plans, net of estimated forfeitures.

The compensation cost attributable to options and awards granted to employees who are eligible to retire or will become eligible to retire during the vesting period, is recognized immediately if the employee is eligible to retire on the grant date or over the period between the grant date and the date the employee becomes eligible to retire.

Our contributions to the employee savings and share ownership plans are expensed as incurred.

Income taxes

Income tax comprises current tax and deferred tax and is recognized in our Consolidated Statements of Income except to the extent that it relates to items recognized directly in equity, in which case it is recognized in equity.

Current income tax payable on profits is recognized as an expense based on the applicable tax laws in each jurisdiction in the period in which profits arise, calculated using tax rates enacted or substantively enacted by the balance sheet date. Deferred tax is recognized on temporary differences between the carrying amounts of assets and liabilities for accounting and tax purposes. A deferred income tax asset or liability is determined for each temporary difference, except for earnings related to our subsidiaries, branches, associates and interests in joint ventures where the temporary differences will not reverse in the foreseeable future and we have the ability to control the timing of reversal. Deferred tax assets and liabilities are determined based on the tax rates that are expected to be in effect in the period that the asset is realized or the liability is settled, based on tax rates and tax laws that have been enacted or substantively enacted at the balance sheet date. Current tax assets and liabilities are offset when they are levied by the same taxation authority on either the same taxable entity or different taxable entities within the same tax reporting group (which intends to settle on a net basis), and when there is a legal right to offset. Deferred tax assets and liabilities are offset when the same conditions are satisfied. Our Consolidated Statements of Income include items that are non-taxable or non-deductible for income tax purposes and, accordingly, this causes the income tax provision to be different from what it would be if based on statutory rates.

Deferred income taxes accumulated as a result of temporary differences and tax loss carryforwards are included in Other assets and Other liabilities. On a quarterly basis, we review our deferred income tax assets to determine whether it is probable that the benefits associated with these assets will be realized; this review involves evaluating both positive and negative evidence.

We are subject to income tax laws in various jurisdictions where we operate, and the complex tax laws are potentially subject to different interpretations by us and the relevant taxation authorities. Significant judgment is required in the interpretation of the relevant tax laws, and the determination of our tax provision which includes our best estimate of tax positions that are under audit or appeal by relevant taxation authorities. We perform a review on a quarterly basis to incorporate our best assessment based on information available, but additional liability and income tax expense could result based on decisions made by the relevant tax authorities.

The determination of our deferred tax asset or liability also requires significant management judgment as the recognition is dependent on our projection of future taxable profits and tax rates that are expected to be in effect in the period the asset is realized or the liability is settled. Any changes in our projection will result in changes in deferred tax assets or liabilities on our Consolidated Balance Sheets, and also deferred tax expense in our Consolidated Statements of Income.

Business combinations, goodwill and other intangibles

All business combinations are accounted for using the acquisition method. Non-controlling interests, if any, are recognized at their proportionate share of the fair value of identifiable assets and liabilities, unless otherwise indicated. Identifiable intangible assets are recognized separately from goodwill and included in Other intangibles. Goodwill represents the excess of the price paid for the business acquired over the fair value of the net identifiable assets acquired on the date of acquisition.

Goodwill

Goodwill is allocated to cash-generating units or groups of cash-generating units for the purpose of impairment testing, which is undertaken at the lowest level at which goodwill is monitored for internal management purposes. Impairment testing is performed annually as at August 1, or more frequently if there are objective indicators of impairment, by comparing the recoverable amount of a cash-generating unit (CGU) with its carrying amount. The recoverable amount of a CGU is the higher of its value in use and its fair value less costs of disposal. Value in use is the present value of the expected future cash flows from a CGU. Fair value less costs of disposal is the amount obtainable from the sale of a CGU in an orderly transaction between market participants, less disposal costs. The fair value of a CGU is estimated using valuation techniques such as a discounted cash flow method, adjusted to reflect the considerations of a prospective third-party buyer. External evidence such as binding sale agreements or recent transactions for similar businesses within the same industry is considered to the extent that it is available.

Significant judgment is involved in estimating the model inputs used to determine the recoverable amount of our CGUs, in particular future cash flows, discount rates and terminal growth rates, due to the uncertainty in the timing and amount of cash flows and the forward-looking nature of these inputs. Future cash flows are based on financial plans agreed by management which are estimated based on forecast results, business initiatives, planned capital investments and returns to shareholders. Discount rates are based on the bank-wide cost of capital, adjusted for CGU-specific risks and currency exposure as reflected by differences in expected inflation. Bank-wide cost of capital is based on the Capital Asset Pricing Model. CGU-specific risks include country risk, business/operational risk, geographic risk (including political risk, devaluation risk, and government regulation), currency risk, and price risk (including product pricing risk and inflation). Terminal growth rates reflect the expected long-term gross domestic product growth and inflation for the countries within which the CGU operates. Changes in these assumptions may impact the amount of impairment loss recognized in Non-interest expense.

The carrying amount of a CGU includes the carrying amount of assets, liabilities and goodwill allocated to the CGU. If the recoverable amount is less than the carrying value, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the CGU and then to the other non-financial assets of the CGU proportionately based on the carrying amount of each asset. Any impairment loss is charged to income in the period in which the impairment is identified. Goodwill is stated at cost less accumulated impairment losses. Subsequent reversals of goodwill impairment are prohibited.

Upon disposal of a portion of a CGU, the carrying amount of goodwill related to the portion of the CGU sold is included in the determination of gains or losses on disposal. The carrying amount is determined based on the relative fair value of the disposed portion to the total CGU.

Other intangibles

Intangible assets represent identifiable non-monetary assets and are acquired either separately or through a business combination, or generated internally. Intangible assets acquired through a business combination are recognized separately from goodwill when they are separable or arise from contractual or other legal rights, and their fair value can be measured reliably. The cost of a separately acquired intangible asset includes its purchase price and directly attributable costs of preparing the asset for its intended use. In respect of internally generated intangible assets, cost includes all directly attributable costs necessary to create, produce, and prepare the asset to be capable of operating in the manner intended by management. Research and development costs that are not eligible for capitalization are expensed. After initial recognition, an intangible asset is carried at its cost less any accumulated amortization and accumulated impairment losses, if any. Intangible assets with a finite-life are amortized on a straight-line basis over their estimated useful lives as follows: computer software – 3 to 10 years; and customer relationships – 10 to 20 years. We do not have any intangible assets with indefinite lives.

Intangible assets are assessed for indicators of impairment at each reporting period. If there is an indication that an intangible asset may be impaired, an impairment test is performed by comparing the carrying amount of the intangible asset to its recoverable amount. Where it is not possible to estimate the recoverable amount of an individual asset, we estimate the recoverable amount of the CGU to which the asset belongs. If the recoverable amount of the asset (or CGU) is less than its carrying amount, the carrying amount of the intangible asset is written down to its recoverable amount as an impairment loss.

An impairment loss recognized previously is reversed if there is a change in the estimates used to determine the recoverable amount of the asset (or CGU) since the last impairment loss was recognized. If an impairment loss is subsequently reversed, the carrying amount of the asset (or CGU) is revised to the lower of its recoverable amount and the carrying amount that would have been determined (net of amortization) had there been no prior impairment.

Due to the subjective nature of these estimates, significant judgment is required in determining the useful lives and recoverable amounts of our intangible assets, and assessing whether certain events or circumstances constitute objective evidence of impairment. Estimates of the recoverable amounts of our intangible assets rely on certain key inputs, including future cash flows and discount rates. Future cash flows are based on sales projections and allocated costs which are estimated based on forecast results and business initiatives. Discount rates are based on the bank-wide cost of capital, adjusted for asset-specific risks. Changes in these assumptions may impact the amount of impairment loss recognized in Non-interest expense.

Other

Translation of foreign currencies

Monetary assets and liabilities denominated in foreign currencies are translated into Canadian dollars at rates prevailing at the balance sheet date. Foreign exchange gains and losses resulting from the translation and settlement of these items are recognized in Non-interest income in the Consolidated Statements of Income.

Non-monetary assets and liabilities that are measured at historical cost are translated into Canadian dollars at historical rates.

Assets and liabilities of our foreign operations with functional currencies other than Canadian dollars are translated into Canadian dollars at rates prevailing at the balance sheet date, and income and expenses of these foreign operations are translated at average rates of exchange for the reporting period.

Unrealized gains or losses arising as a result of the translation of our foreign operations along with the effective portion of related hedges are reported in Other components of equity on an after-tax basis. Upon disposal or partial disposal of a foreign operation, an appropriate portion of the accumulated net translation gains or losses is included in Non-interest income.

Premises and equipment

Premises and equipment includes land, buildings, leasehold improvements, computer equipment, furniture, fixtures and other equipment, and are stated at cost less accumulated depreciation, except for land which is not depreciated, and accumulated impairment losses. Cost comprises the purchase price, any costs directly attributable to bringing the asset to the location and condition necessary for its intended use, and the initial estimate of any disposal costs. Depreciation is recorded principally on a straight–line basis over the estimated useful lives of the assets, which are 25 to 50 years for buildings, 3 to 10 years for computer equipment, and 7 to 10 years for furniture, fixtures and other equipment. The amortization period for leasehold improvements is the lesser of the useful life of the leasehold improvements or the lease term plus the first renewal period, if reasonably assured of renewal, up to a maximum of 10 years. Depreciation methods, useful lives, and residual values are reassessed at each reporting period and adjusted as appropriate. Gains and losses on disposal are recorded in Non–interest income.

Premises and equipment are assessed for indicators of impairment at each reporting period. If there is an indication that an asset may be impaired, an impairment test is performed by comparing the asset's carrying amount to its recoverable amount. 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 and test for impairment at the CGU level. An impairment charge is recorded to the extent the recoverable amount of an asset (or CGU), which is the higher of value in use and fair value less costs of disposal, is less than its carrying amount. Value in use is the present value of the future cash flows expected to be derived from the asset (or CGU). Fair value less costs of disposal is the amount obtainable from the sale of the asset (or CGU) in an orderly transaction between market participants, less costs of disposal.

After the recognition of impairment, the depreciation charge is adjusted in future periods to reflect the asset's revised carrying amount. If an impairment is later reversed, the carrying amount of the asset is revised to the lower of the asset's recoverable amount and the carrying amount that would have been determined (net of depreciation) had there been no prior impairment loss. The depreciation charge in future periods is adjusted to reflect the revised carrying amount.

Provisions

Provisions are liabilities of uncertain timing or amount and are recognized when we have a present legal or constructive obligation as a result of a past event, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Provisions are measured as the best estimate of the consideration required to settle the present obligation at the reporting date. Significant judgment is required in determining whether a present obligation exists and in estimating the probability, timing and amount of any outflows. We record provisions related to litigation, uncertain tax positions, and asset retirement obligations 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, tax positions that are under audit or appeal by relevant taxation authorities, and expenses to be incurred to dispose of capital assets. The forward-looking nature of these estimates requires us to use a significant amount of judgment in projecting the timing and amount of future cash flows. We record our provisions on the basis of all available information at the end of the reporting period and make adjustments on a quarterly basis to reflect current expectations. It may not be possible to predict the resolution of these matters or the timing of their ultimate resolution. Should actual results differ from our expectations, we may incur expenses in excess of the provisions recognized. Where appropriate, we apply judgment in limiting the extent of our provisions related disclosures as not to prejudice our positions in matters of dispute.

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

Commissions and fees

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

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

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

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

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

Earnings per share
Earnings per share is computed by dividing Net income available to common shareholders by the weighted average number of common shares outstanding for the period. Net income available to common shareholders is determined after deducting dividend entitlements of preferred shareholders, any gains (losses) on redemption of preferred shares net of related income taxes and the net income attributable to non-controlling interests.

Diluted earnings per share reflects the potential dilution that could occur if additional common shares are assumed to be issued under securities or contracts that entitle their holders to obtain common shares in the future, to the extent such entitlement is not subject to unresolved contingencies. For contracts that may be settled in cash or in common shares at our option, diluted earnings per share is calculated based on the assumption that such contracts will be settled in shares. Income and expenses associated with these types of contracts are excluded from the Net income available to common shareholders, and the additional number of shares that would be issued is included in the diluted earnings per share calculation. This includes certain convertible shares with the conversion assumed to have taken place at the beginning of the period or on the date of issue, if later. For stock options whose exercise price is less than the average market price of our common shares, using the treasury stock method, they are assumed to be exercised and the proceeds are used to repurchase common shares at the average market price for the period. The incremental number of common shares issued under stock options and repurchased from proceeds is included in the calculation of diluted earnings per share.

Share capital
We classify a financial instrument that we issue as a financial asset, financial liability or an equity instrument in accordance with the substance of the contractual arrangement.

Our common shares held by us are classified as treasury shares in equity and accounted for at weighted average cost. Upon the sale of treasury shares, the difference between the sale proceeds and the cost of the shares is recognized in Retained earnings. Financial instruments issued by us are classified as equity instruments when there is no contractual obligation to transfer cash or other financial assets. Incremental costs directly attributable to the issue of equity instruments are included in equity as a deduction from the proceeds, net of tax. Financial instruments that will be settled by a variable number of our common shares upon their conversion by the holders as well as the related accrued distributions are classified as liabilities on our Consolidated Balance Sheets. Dividends and yield distributions on these instruments are classified as Interest expense in our Consolidated Statements of Income.

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

IFRS 15 *Revenue from Contracts with Customers* (IFRS 15)
In May 2014, the IASB issued IFRS 15, which establishes the principles for reporting about the nature, amount, timing and uncertainty of revenue and cash flows arising from an entity's contracts with customers. The standard provides a single, principles based five-step model for revenue recognition to be applied to contracts with customers except for revenue arising from items such as financial instruments, insurance contracts and leases.

We will adopt IFRS 15 by adjusting our Consolidated Financial Statements at November 1, 2018, the date of initial application, with no restatement of comparative periods. The adoption of IFRS 15 is not expected to have a material impact on our Consolidated Financial Statements.

IFRS 16 *Leases* (IFRS 16)
In January 2016, the IASB issued IFRS 16, which sets out the principles for the recognition, measurement, presentation and disclosure of leases. The standard removes the current requirement for lessees to classify leases as finance leases or operating leases by introducing a single lessee accounting model that requires the recognition of lease assets and lease liabilities on the balance sheet for most leases. Lessees will also recognize depreciation expense on the lease asset and interest expense on the lease liability in the statement of income. There are no significant changes to lessor accounting aside from enhanced disclosure requirements. IFRS 16 will be effective for us on November 1, 2019. We are currently assessing the impact of adopting this standard on our Consolidated Financial Statements.

IFRS 17 Insurance Contracts (IFRS 17)
In May 2017, the IASB issued IFRS 17 to establish a comprehensive global insurance standard which provides guidance on the recognition, measurement, presentation and disclosures of insurance contracts. IFRS 17 requires entities to measure insurance contract liabilities at their current fulfillment values using one of three approaches. This new standard will be effective for us on November 1, 2021 and will be applied retrospectively with restatement of comparatives unless impracticable. In November 2018, the IASB tentatively decided to defer the IFRS 17 effective date by one year. We will continue to monitor the IASB's developments. We are currently assessing the impact of adopting this standard on our Consolidated Financial Statements.

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

Note 3 Fair value of financial instruments

Carrying value and fair value of financial instruments

The following tables provide a comparison of the carrying and fair values for each classification of financial instruments. Embedded derivatives are presented on a combined basis with the host contracts. For measurement purposes, they are carried at fair value when conditions requiring separation are met.

	IFRS 9							
	As at October 31, 2018							
	Carrying value and fair value				Carrying value	Fair value		
(Millions of Canadian dollars)	Financial instruments classified as FVTPL	Financial instruments designated as FVTPL	Financial instruments classified as FVOCI	Financial instruments designated as FVOCI	Financial instruments measured at amortized cost	Financial instruments measured at amortized cost	Total carrying amount	Total fair value
Financial assets								
Interest-bearing deposits with banks	$ –	$ 20,274	$ –	$ –	$ 16,197	$ 16,197	$ 36,471	$ 36,471
Securities								
Trading	121,031	7,227	–	–	–	–	128,258	128,258
Investment, net of applicable allowance (1)	–	–	48,093	406	46,109	45,367	94,608	93,866
	121,031	7,227	48,093	406	46,109	45,367	222,866	222,124
Assets purchased under reverse repurchase agreements and securities borrowed	219,108	–	–	–	75,494	75,490	294,602	294,598
Loans, net of applicable allowance								
Retail	69	190	94	–	397,102	394,051	397,455	394,404
Wholesale	7,129	1,540	458	–	170,236	168,087	179,363	177,214
	7,198	1,730	552	–	567,338	562,138	576,818	571,618
Other								
Derivatives	94,039	–	–	–	–	–	94,039	94,039
Other assets (2)	1,373	–	–	–	46,205	46,205	47,578	47,578
Financial liabilities								
Deposits								
Personal	$ 150	$ 14,602			$ 255,402	$ 255,115	$ 270,154	$ 269,867
Business and government (3)	(11)	103,446			430,936	431,158	534,371	534,593
Bank (4)	–	7,072			25,449	25,462	32,521	32,534
	139	125,120			711,787	711,735	837,046	836,994
Other								
Obligations related to securities sold short	32,247	–			–	–	32,247	32,247
Obligations related to assets sold under repurchase agreements and securities loaned	–	201,839			4,975	4,976	206,814	206,815
Derivatives	90,238	–			–	–	90,238	90,238
Other liabilities (5)	(1,434)	18			54,917	54,880	53,501	53,464
Subordinated debentures	–	–			9,131	9,319	9,131	9,319

	IAS 39						
	As at October 31, 2017						
	Carrying value and fair value			Carrying value	Fair value		
(Millions of Canadian dollars)	Financial instruments classified as FVTPL	Financial instruments designated as FVTPL	Available-for-sale instruments measured at fair value	Financial instruments measured at amortized cost	Financial instruments measured at amortized cost	Total carrying amount	Total fair value
Financial assets							
Interest-bearing deposits with banks	$ –	$ 20,752	$ –	$ 11,910	$ 11,910	$ 32,662	$ 32,662
Securities							
Trading	116,720	10,937	–	–	–	127,657	127,657
Investment, net of applicable allowance (1)	–	–	75,877	14,845	14,771	90,722	90,648
	116,720	10,937	75,877	14,845	14,771	218,379	218,305
Assets purchased under reverse repurchase agreements and securities borrowed	–	138,979	–	81,998	81,999	220,977	220,978
Loans, net of applicable allowance							
Retail	69	–	–	383,857	380,782	383,926	380,851
Wholesale	1,837	2,329	–	154,525	153,967	158,691	158,133
	1,906	2,329	–	538,382	534,749	542,617	538,984
Other							
Derivatives	95,023	–	–	–	–	95,023	95,023
Other assets (2)	–	1,213	–	44,598	44,598	45,811	45,811
Financial liabilities							
Deposits							
Personal	$ 184	$ 13,794		$ 246,235	$ 246,147	$ 260,213	$ 260,125
Business and government (3)	(9)	94,518		411,156	412,495	505,665	507,004
Bank (4)	–	2,072		21,685	21,708	23,757	23,780
	175	110,384		679,076	680,350	789,635	790,909
Other							
Obligations related to securities sold short	30,008	–		–	–	30,008	30,008
Obligations related to assets sold under repurchase agreements and securities loaned	–	133,947		9,137	9,138	143,084	143,085
Derivatives	92,127	–		–	–	92,127	92,127
Other liabilities (5)	(1,132)	–		49,440	49,426	48,308	48,294
Subordinated debentures	–	–		9,265	9,559	9,265	9,559

(1) Investment securities include securities measured at FVOCI and amortized cost under IFRS 9 and AFS and held-to-maturity securities under IAS 39.
(2) Includes Customers' liability under acceptances and financial instruments recognized in Other assets.
(3) Business and government deposits include deposits from regulated deposit-taking institutions other than banks.
(4) Bank deposits refer to deposits from regulated banks and central banks.
(5) Includes Acceptances and financial instruments recognized in Other liabilities.

Financial assets designated as fair value through profit or loss

For our financial assets designated as FVTPL, we measure the change in fair value attributable to changes in credit risk as the difference between the total change in the fair value of the instrument during the period and the change in fair value calculated using the appropriate risk-free yield curves. For the years ended October 31, 2018 and October 31, 2017, there were no significant changes in the fair value of the loans and receivables designated as FVTPL attributable to changes in credit risk. As at October 31, 2018 and October 31, 2017, the extent to which credit derivatives or similar instruments mitigate the maximum exposure to credit risk was nominal.

Financial liabilities designated as fair value through profit or loss

For our financial liabilities designated as FVTPL, we take into account changes in our own credit spread and the expected duration of the instrument to measure the change in fair value attributable to changes in credit risk.

	As at or for the year ended October 31, 2018 (1)				
				Changes in fair value attributable to changes in credit risk included in OCI for positions still held	
(Millions of Canadian dollars)	Contractual maturity amount	Carrying value	Difference between carrying value and contractual maturity amount	During the period	Cumulative (2)
Term deposits					
Personal	$ 14,726	$ 14,602	$ (124)	$ (41)	$ 19
Business and government (3)	103,489	103,446	(43)	(134)	285
Bank (4)	7,067	7,072	5	–	–
	125,282	125,120	(162)	(175)	304
Obligations related to assets sold under repurchase agreements and securities loaned	201,924	201,839	(85)	–	–
Other liabilities	18	18	–	–	–
	$ 327,224	$ 326,977	$ (247)	$ (175)	$ 304

	As at or for the year ended October 31, 2017 (1)				
				Changes in fair value attributable to changes in credit risk included in OCI for positions still held	
(Millions of Canadian dollars)	Contractual maturity amount	Carrying value	Difference between carrying value and contractual maturity amount	During the period	Cumulative (2)
Term deposits					
Personal	$ 13,633	$ 13,794	$ 161	$ 34	$ 59
Business and government (3)	93,532	94,518	986	398	423
Bank (4)	2,072	2,072	–	–	–
	109,237	110,384	1,147	432	482
Obligations related to assets sold under repurchase agreements and securities loaned	133,967	133,947	(20)	–	–
Other liabilities	–	–	–	–	–
	$ 243,204	$ 244,331	$ 1,127	$ 432	$ 482

(1) There are no changes in fair value attributable to changes in credit risk included in net income for positions still held.
(2) The cumulative change is measured from the initial designation of the liabilities as FVTPL. For the year ended October 31, 2018, $7 million of fair value losses previously included in OCI relate to financial liabilities derecognized during the year (October 31, 2017 – $16 million fair value gains).
(3) Business and government term deposits include amounts from regulated deposit-taking institutions other than regulated banks.
(4) Bank term deposits refer to amounts from regulated banks and central banks.

Net gains (losses) from financial instruments classified and designated as fair value through profit or loss

Financial instruments classified as FVTPL, which includes mainly trading securities, derivatives, trading liabilities, and financial assets and liabilities designated as FVTPL are measured at fair value with realized and unrealized gains and losses recognized in Non-interest income.

	IFRS 9	IAS 39
	For the year ended	
(Millions of Canadian dollars)	October 31 2018	October 31 2017
Net gains (losses) (1)		
Classified as fair value through profit or loss (2)	$ (265)	$ 1,112
Designated as fair value through profit or loss (3)	1,828	(68)
	$ 1,563	$ 1,044
By product line (1)		
Interest rate and credit	$ 1,296	$ 662
Equities	(164)	(54)
Foreign exchange and commodities	431	436
	$ 1,563	$ 1,044

(1) Excludes the following amounts related to our insurance operations and included in Insurance premiums, investment and fee income in the Consolidated Statements of Income: Net losses from financial instruments designated as FVTPL of $400 million (October 31, 2017 – losses of $148 million).
(2) Excludes derivatives designated in a hedging relationship. Refer to Note 8 for net gains (losses) on these derivatives.
(3) For the year ended October 31, 2018, $1,832 million of net fair value gains on financial liabilities designated as FVTPL, other than those attributable to changes in our own credit risk, were included in Non-interest income (October 31, 2017 – losses of $645 million).

Net interest income from financial instruments

Interest and dividend income arising from financial assets and financial liabilities and the associated costs of funding are reported in Net interest income.

	IFRS 9	IAS 39
	For the year ended	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Interest income and dividend income (1), (2)		
Financial instruments measured at fair value through profit or loss	$ 7,811	$ 6,043
Financial instruments measured at fair value through other comprehensive income	802	
Financial instruments measured at amortized cost	24,408	
Other categories of financial instruments (3)		20,861
	33,021	26,904
Interest expense (1)		
Financial instruments measured at fair value through profit or loss	$ 6,964	$ 3,934
Financial instruments measured at amortized cost	7,866	
Other categories of financial instruments (3)		5,830
	14,830	9,764
Net interest income	$ 18,191	$ 17,140

(1) Excludes the following amounts related to our insurance operations and included in Insurance premiums, investment and fee income in the Consolidated Statements of Income: Interest income of $479 million (October 31, 2017 – $459 million), and Interest expense of $4 million (October 31, 2017 – $5 million).

(2) Includes dividend income for the year ended October 31, 2018 of $1,561 million (October 31, 2017 – $1,357 million), which is presented in Interest and dividend income in the Consolidated Statements of Income.

(3) Includes assets classified as available-for-sale, loans and receivables, and held-to-maturity, and liabilities classified as amortized cost.

Fee income arising from financial instruments

For the year ended October 31, 2018, we earned $5,426 million in fees from banking services (October 31, 2017 – $5,139 million). For the year ended October 31, 2018, we also earned $11,944 million in fees from investment management, trust, custodial, underwriting, brokerage and other similar fiduciary services to retail and institutional clients (October 31, 2017 – $11,191 million). These fees are included in Non-interest income.

Fair value of assets and liabilities measured at fair value on a recurring basis and classified using the fair value hierarchy

	IFRS 9						IAS 39					
	As at											
	October 31, 2018						October 31, 2017					
	Fair value measurements using			Total gross fair	Netting	Assets/ liabilities	Fair value measurements using			Total gross fair	Netting	Assets/ liabilities
(Millions of Canadian dollars)	Level 1	Level 2	Level 3	value	adjustments	at fair value	Level 1	Level 2	Level 3	value	adjustments	at fair value
Financial assets												
Interest-bearing deposits with banks	$ –	$ 20,274	$ –	$ 20,274	$	$ 20,274	$ –	$ 20,752	$ –	$ 20,752	$	$ 20,752
Securities												
Trading												
Canadian government debt (1)												
Federal	8,342	6,231	–	14,573		14,573	9,374	7,929	–	17,303		17,303
Provincial and municipal	–	11,350	–	11,350		11,350	–	11,422	–	11,422		11,422
U.S. state, municipal and agencies debt (1)	2,068	31,030	66	33,164		33,164	1,226	29,634	–	30,860		30,860
Other OECD government debt (2)	1,151	9,018	–	10,169		10,169	934	10,420	–	11,354		11,354
Mortgage-backed securities (1)	–	1,001	–	1,001		1,001	–	1,298	–	1,298		1,298
Asset-backed securities												
Non-CDO securities (3)	–	1,023	110	1,133		1,133	–	732	–	732		732
Corporate debt and other debt	2	22,303	21	22,326		22,326	52	21,655	29	21,736		21,736
Equities	30,847	2,547	1,148	34,542		34,542	29,674	2,853	425	32,952		32,952
	42,410	84,503	1,345	128,258		128,258	41,260	85,943	454	127,657		127,657
Investment (4)												
Canadian government debt (1)												
Federal	–	238	–	238		238	477	1,124	–	1,601		1,601
Provincial and municipal	–	1,554	–	1,554		1,554	–	2,503	–	2,503		2,503
U.S. state, municipal and agencies debt (1)	–	18,136	–	18,136		18,136	8	28,999	508	29,515		29,515
Other OECD government debt	–	1,470	–	1,470		1,470	479	8,673	–	9,152		9,152
Mortgage-backed securities (1)	–	2,174	–	2,174		2,174	–	934	–	934		934
Asset-backed securities												
CDO	–	6,239	–	6,239		6,239	–	3,623	–	3,623		3,623
Non-CDO securities	–	863	–	863		863	–	2,671	203	2,874		2,874
Corporate debt and other debt	–	17,227	192	17,419		17,419	–	23,662	797	24,459		24,459
Equities	42	103	237	382		382	339	38	711	1,088		1,088
Loan substitute securities	–	24	–	24		24	–	24	4	28		28
	42	48,028	429	48,499		48,499	1,303	72,251	2,223	75,777		75,777
Assets purchased under reverse repurchase agreements and securities borrowed	–	219,108	–	219,108		219,108	–	138,979	–	138,979		138,979
Loans	–	8,929	551	9,480		9,480	–	4,056	179	4,235		4,235
Other												
Derivatives												
Interest rate contracts	1	33,862	222	34,085		34,085	–	106,145	380	106,525		106,525
Foreign exchange contracts	–	43,253	53	43,306		43,306	–	42,871	63	42,934		42,934
Credit derivatives	–	38	–	38		38	–	157	–	157		157
Other contracts	5,868	11,654	296	17,818		17,818	3,510	10,141	307	13,958		13,958
Valuation adjustments	–	(631)	6	(625)		(625)	–	(722)	(3)	(725)		(725)
Total gross derivatives	5,869	88,176	577	94,622		94,622	3,510	158,592	747	162,849		162,849
Netting adjustments					(583)	(583)					(67,826)	(67,826)
Total derivatives						94,039						95,023
Other assets	1,020	288	65	1,373		1,373	966	247	–	1,213		1,213
	$ 49,341	$ 469,306	$ 2,967	$ 521,614	$ (583)	$ 521,031	$ 47,039	$ 480,820	$ 3,603	$ 531,462	$ (67,826)	$ 463,636
Financial Liabilities												
Deposits												
Personal	$ –	$ 14,362	$ 390	$ 14,752	$	$ 14,752	$ –	$ 13,513	$ 465	$ 13,978	$	$ 13,978
Business and government	–	103,440	(5)	103,435		103,435	–	94,509	–	94,509		94,509
Bank	–	7,072	–	7,072		7,072	–	2,072	–	2,072		2,072
Other												
Obligations related to securities sold short	17,732	14,515	–	32,247		32,247	12,407	17,601	–	30,008		30,008
Obligations related to assets sold under repurchase agreements and securities loaned	–	201,839	–	201,839		201,839	–	133,947	–	133,947		133,947
Derivatives												
Interest rate contracts	–	29,620	726	30,346		30,346	–	100,765	835	101,600		101,600
Foreign exchange contracts	–	41,836	32	41,868		41,868	–	40,497	42	40,539		40,539
Credit derivatives	–	94	–	94		94	–	258	–	258		258
Other contracts	4,369	13,730	380	18,479		18,479	3,417	13,461	488	17,366		17,366
Valuation adjustments	–	29	5	34		34	–	55	13	68		68
Total gross derivatives	4,369	85,309	1,143	90,821		90,821	3,417	155,036	1,378	159,831		159,831
Netting adjustments					(583)	(583)					(67,704)	(67,704)
Total derivatives						90,238						92,127
Other liabilities	170	(1,654)	68	(1,416)		(1,416)	130	(1,286)	24	(1,132)		(1,132)
	$ 22,271	$ 424,883	$ 1,596	$448,750	$ (583)	$ 448,167	$ 15,954	$ 415,392	$ 1,867	$ 433,213	$ (67,704)	$ 365,509

(1) As at October 31, 2018, residential and commercial mortgage-backed securities (MBS) included in all fair value levels of trading securities were $16,776 million and $nil (October 31, 2017 – $17,977 million and $nil), respectively, and in all fair value levels of Investment securities were $4,713 million and $1,348 million (October 31, 2017 – $13,352 million and $727 million), respectively.
(2) OECD stands for Organisation for Economic Co-operation and Development.
(3) CDO stands for collateralized debt obligations.
(4) Amounts as of October 31, 2017 exclude $100 million of Investment securities that are carried at cost.

Fair values of our significant assets and liabilities measured on a recurring basis are determined and classified in the fair value hierarchy table using the following valuation techniques and inputs.

Interest-bearing deposits with banks
The majority of our Interest-bearing deposits with banks are designated as FVTPL. These FVTPL deposits are composed of short-dated deposits placed with banks, and are included in Interest-bearing deposits with banks in the fair value hierarchy table. The fair values of these instruments are determined using the discounted cash flow method. The inputs to the valuation models include interest rate swap curves and credit spreads, where applicable. They are classified as Level 2 instruments in the hierarchy as the inputs are observable.

Government bonds (Canadian, U.S. and other OECD governments)
Government bonds are included in Canadian government debt, U.S. state, municipal and agencies debt, Other OECD government debt and Obligations related to securities sold short in the fair value hierarchy table. The fair values of government issued or guaranteed debt securities in active markets are determined by reference to recent transaction prices, broker quotes, or third-party vendor prices and are classified as Level 1 in the hierarchy. The fair values of securities that are not traded in active markets are based on either security prices, or valuation techniques using implied yields and risk spreads derived from prices of actively traded and similar government securities. Securities with observable prices or rate inputs as compared to transaction prices, dealer quotes or vendor prices are classified as Level 2 in the hierarchy. Securities where inputs are unobservable are classified as Level 3 in the hierarchy.

Corporate and U.S. municipal bonds
The fair values of corporate and U.S. municipal bonds, which are included in Corporate debt and other debt, U.S. state, municipal and agencies debt and Obligations related to securities sold short in the fair value hierarchy table, are determined using either recently executed transaction prices, broker quotes, pricing services, or in certain instances, the discounted cash flow method using rate inputs such as benchmark yields (Canadian Dealer Offered Rate, LIBOR and other similar reference rates) and risk spreads of comparable securities. Securities with observable prices or rate inputs are classified as Level 2 in the hierarchy. Securities where inputs are unobservable are classified as Level 3 in the hierarchy.

Asset-backed securities and Mortgage-backed securities
Asset-backed securities (ABS) and MBS are included in Asset-backed securities, Mortgage-backed securities, Canadian government debt, U.S. state, municipal and agencies debt, and Obligations related to securities sold short in the fair value hierarchy table. Inputs for valuation of ABS and MBS are, when available, traded prices, dealer or lead manager quotes, broker quotes and vendor prices of the identical securities. When prices of the identical securities are not readily available, we use industry standard models with inputs such as discount margins, yields, default, prepayment and loss severity rates that are implied from transaction prices, dealer quotes or vendor prices of comparable instruments. Where security prices and inputs are observable, ABS and MBS are classified as Level 2 in the hierarchy. Otherwise, they are classified as Level 3 in the hierarchy.

Auction rate securities
Auction rate securities (ARS) are included in U.S. state, municipal and agencies debt, and Asset-backed securities in the fair value hierarchy table. The valuation of ARS involves discounting forecasted cash flows from the underlying collateral and incorporating multiple inputs such as default, prepayment, deferment and redemption rates, and credit spreads. These inputs are unobservable, and therefore, ARS are classified as Level 3 in the hierarchy. All relevant data must be assessed and significant judgment is required to determine the appropriate valuation inputs.

Equities
Equities consist of listed and unlisted common shares, private equities, mutual funds and hedge funds with certain redemption restrictions and are included in equities and obligations for securities sold short. The fair values of common shares are based on quoted prices in active markets, where available, and are classified as Level 1 in the hierarchy. Where quoted prices in active markets are not readily available, fair value is determined based on quoted market prices for similar securities or through valuation techniques, such as multiples of earnings and the discounted cash flow method with forecasted cash flows and discount rate as inputs. Private equities are classified as Level 3 in the hierarchy as their inputs are not observable. Hedge funds are valued using Net Asset Values (NAV). If we can redeem a hedge fund at NAV prior to the next quarter end, the fund is classified as Level 2 in the hierarchy. Otherwise, it is classified as Level 3 in the hierarchy.

Derivatives
The fair values of exchange-traded derivatives, such as interest rate and equity options and futures, are based on quoted market prices and are classified as Level 1 in the hierarchy. OTC derivatives primarily consist of interest rate contracts, foreign exchange contracts and credit derivatives. The exchange-traded or OTC interest rate, foreign exchange and equity derivatives are included in Interest rate contracts, Foreign exchange contracts and Other contracts, respectively, in the fair value hierarchy table. The fair values of OTC derivatives are determined using valuation models when quoted market prices or third-party consensus pricing information are not available. The valuation models, such as discounted cash flow method or Black-Scholes option model, incorporate observable or unobservable inputs for interest and foreign exchange rates, equity and commodity prices (including indices), credit spreads, corresponding market volatility levels, and other market-based pricing factors. Other adjustments to fair value include bid-offer, CVA, FVA, OIS, parameter and model uncertainties, and unrealized gain or loss at inception of a transaction. A derivative instrument is classified as Level 2 in the hierarchy if observable market inputs are available or the unobservable inputs are not significant to the fair value. Otherwise, it is classified as Level 3 in the hierarchy.

Securities borrowed or purchased under resale agreements and securities loaned or sold under repurchase agreements
In the fair value hierarchy table, these instruments are included in Assets purchased under reverse repurchase agreements and securities borrowed, and Obligations related to assets sold under repurchase agreements and securities loaned. The fair values of these contracts are determined using valuation techniques such as the discounted cash flow method using interest rate curves as inputs. They are classified as Level 2 instruments in the hierarchy as the inputs are observable.

Deposits
A majority of our deposits are measured at amortized cost but certain deposits are designated as FVTPL. These FVTPL deposits include deposits taken from clients, the issuance of certificates of deposits and promissory notes, and interest rate and equity linked notes. The fair values of

these instruments are determined using the discounted cash flow method and derivative option valuation models. The inputs to the valuation models include benchmark yield curves, credit spreads, interest rates, equity and interest rate volatility, dividend and correlation rates, where applicable. They are classified as Level 2 or 3 instruments in the hierarchy, depending on the significance of the unobservable credit spreads, volatility, dividend and correlation rates.

Quantitative information about fair value measurements using significant unobservable inputs (Level 3 Instruments)
The following table presents fair values of our significant Level 3 financial instruments, valuation techniques used to determine their fair values, ranges and weighted averages of unobservable inputs.

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

		Fair value				**Range of input values (2) (3)**		
Products	Reporting line in the fair value hierarchy table	**Assets**	**Liabilities**	Valuation techniques	Significant unobservable inputs (1)	**Low**	**High**	**Weighted average / Inputs distribution**
Non-derivative financial instruments								
Auction rate securities				Discounted cash flows	Discount margins	1.32%	2.70%	1.95%
	U.S. state, municipal and agencies debt	45			Default rates	3.00%	3.00%	3.00%
	Asset-backed securities	110			Prepayment rates	4.00%	5.50%	4.56%
					Recovery rates	96.50%	97.50%	96.59%
Corporate debt				Price-based	Prices	$ 72.00	$123.06	$ 103.84
	Corporate debt and other debt	28		Discounted cash flows	Credit spread	0.90%	11.30%	4.50%
	Loans	551			Credit enhancement	11.80%	15.80%	13.10%
Government debt and municipal bonds				Price-based	Prices	$ 65.50	$100.00	$ 66,41
	U.S. state, municipal and agencies debt	21		Discounted cash flows	Yields	3.50%	7.60%	5.75%
	Corporate debt and other debt	185						
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	6.16X	17.80X	14.46X
	Equities	1,385		Price-based	P/E multiples	9.10X	26.41X	18.26X
	Derivative related liabilities		24	Discounted cash flows	EV/Rev multiples	0.90X	6.63X	4.86X
	Loan substitute securities	–			Liquidity discounts (4)	10.00%	40.00%	18.27%
					Discount rate	10.52%	10.52%	10.52%
					Net asset values / prices (5)	n.a.	n.a.	n.a.
Derivative financial instruments (6)								
Interest rate derivatives and interest-rate-linked structured notes (7)	Derivative related assets	260		Discounted cash flows	Interest rates	2.30%	3.00%	Even
	Derivative related liabilities		740	Option pricing model	CPI swap rates	1.90%	2.10%	Even
					IR-IR correlations	19.00%	67.00%	Even
					FX-IR correlations	29.00%	56.00%	Even
					FX-FX correlations	68.00%	68.00%	Even
Equity derivatives and equity-linked structured notes (7)				Discounted cash flows	Dividend yields	0.30%	8.40%	Lower
	Derivative related assets	281		Option pricing model	Equity (EQ)-EQ correlations	(55.00)%	100.00%	Middle
	Deposits		390		EQ-FX correlations	(71.40)%	30.50%	Middle
	Derivative related liabilities		328		EQ volatilities	8.00%	164.00%	Upper
Other (8)								
	Asset-backed securities	–						
	Derivative related assets	36						
	Other assets	65						
	Deposits		(5)					
	Derivative related liabilities		51					
	Other liabilities		68					
Total		$ 2,967	$ 1,596					

As at October 31, 2017 (Millions of Canadian dollars, except for prices, percentages and ratios)

		Fair value				Range of input values (2) (3)		
Products	Reporting line in the fair value hierarchy table	Assets	Liabilities	Valuation techniques	Significant unobservable inputs (1)	Low	High	Weighted average / Inputs distribution
Non-derivative financial instruments								
Auction rate securities				Discounted cash flows	Discount margins	1.13%	2.95%	1.71%
	U.S. state, municipal and agencies debt	508			Default rates	3.00%	3.40%	3.00%
	Asset-backed securities	197			Prepayment rates	4.00%	10.00%	4.29%
					Recovery rates	40.00%	97.50%	95.95%
Corporate debt				Price-based	Prices	$ 20.00	$ 119.30	$ 113.77
	Corporate debt and other debt	33		Discounted cash flows	Credit spread	1.11%	11.59%	6.35%
	Loans	179			Credit enhancement	12.82%	17.10%	14.16%
Government debt and municipal bonds				Price-based	Prices	$ 63.43	$ 93.29	$ 64.18
	U.S. state, municipal and agencies debt	–		Discounted cash flows	Yields	0.17%	13.04%	3.22%
	Corporate debt and other debt	793						
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	9.30X	16.60X	13.32X
	Equities	1,136		Price-based	P/E multiples	4.80X	27.40X	19.42X
	Derivative related liabilities		97	Discounted cash flows	EV/Rev multiples	1.50X	9.51X	5.75X
	Loan substitute securities	4			Liquidity discounts (4)	15.00%	40.00%	25.24%
					Discount rate	11.00%	11.00%	11.00%
					Net asset values / prices (5)	n.a.	n.a.	n.a.
Derivative financial instruments (6)								
Interest rate derivatives and interest-rate-linked structured notes (7)	Derivative related assets	415		Discounted cash flows	Interest rates	2.23%	2.56%	Even
	Deposits			Option pricing model	CPI swap rates	1.72%	1.90%	Even
	Derivative related liabilities		843		IR-IR correlations	19.00%	67.00%	Even
					FX-IR correlations	29.00%	56.00%	Even
					FX-FX correlations	68.00%	68.00%	Even
Equity derivatives and equity-linked structured notes (7)				Discounted cash flows	Dividend yields	0.02%	10.49%	Lower
	Derivative related assets	302		Option pricing model	Equity (EQ)-EQ correlations	15.00%	97.34%	Middle
	Deposits		465		EQ-FX correlations	(70.00)%	39.10%	Middle
	Derivative related liabilities		369		EQ volatilities	3.00%	110.00%	Lower
Other (8)								
	Asset-backed securities	6						
	Derivative related assets	30						
	Deposits		–					
	Derivative related liabilities		69					
	Other liabilities		24					
Total		$ 3,603	$ 1,867					

(1) The acronyms stand for the following: (i) Enterprise Value (EV); (ii) Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA); (iii) Price / Earnings (P/E); (iv) Revenue (Rev); (v) Consumer Price Index (CPI); (vi) Interest Rate (IR); (vii) Foreign Exchange (FX); and (viii) Equity (EQ).

(2) The low and high input values represent the actual highest and lowest level inputs used to value a group of financial instruments in a particular product category. These input ranges do not reflect the level of input uncertainty, but are affected by the different underlying instruments within the product category. The input ranges will therefore vary from period to period based on the characteristics of the underlying instruments held at each balance sheet date. Where provided, the weighted average of the input values is calculated based on the relative fair values of the instruments within the product category. The weighted averages for derivatives are not presented in the table as they would not provide a comparable metric; instead, distribution of significant unobservable inputs within the range for each product category is indicated in the table.

(3) Price-based inputs are significant for certain debt securities and are based on external benchmarks, comparable proxy instruments or pre-quarter-end trade data. For these instruments, the price input is expressed in dollars for each $100 par value. For example, with an input price of $105, an instrument is valued at a premium over its par value.

(4) Fair value of securities with liquidity discount inputs totalled $207 million (October 31, 2017 – $54 million).

(5) NAV of a hedge fund is total fair value of assets less liabilities divided by the number of fund units. The NAV of the funds and the corresponding equity derivatives referenced to NAV are not considered observable as we cannot redeem certain of these hedge funds at NAV prior to the next quarter end. Private equities are valued based on NAV or valuation techniques. The range for NAV per unit or price per share has not been disclosed for the hedge funds or private equities due to the dispersion of prices given the diverse nature of the investments.

(6) The level of aggregation and diversity within each derivative instrument category may result in certain ranges of inputs being wide and inputs being unevenly distributed across the range. In the table, we indicated whether the majority of the inputs are concentrated toward the upper, middle, or lower end of the range, or evenly distributed throughout the range.

(7) The structured notes contain embedded equity or interest rate derivatives with unobservable inputs that are similar to those of the equity or interest rate derivatives.

(8) Other primarily includes certain insignificant instruments such as commodity derivatives, foreign exchange derivatives, contingent considerations, bank-owned life insurance and retractable shares.

n.a. not applicable

Sensitivity to unobservable inputs and interrelationships between unobservable inputs

Yield, credit spreads/discount margins

A financial instrument's yield is the interest rate used to discount future cash flows in a valuation model. An increase in the yield, in isolation, would result in a decrease in a fair value measurement and vice versa. A credit spread/discount margin is the difference between a debt instrument's yield and a benchmark instrument's yield. Benchmark instruments have high credit quality ratings, similar maturities and are often government bonds. The credit spread/discount margin therefore represents the discount rate used to determine the present value of future cash flows of an asset to reflect the market return required for uncertainty in the estimated cash flows. The credit spread/discount margin for an instrument forms part of the yield used in a discounted cash flow method.

Funding spread

Funding spreads are credit spreads specific to funding or deposit rates. A decrease in funding spreads, on its own, will increase fair value of our liabilities, and vice versa.

Default rates

A default rate is the rate at which borrowers fail to make scheduled loan payments. A decrease in the default rate will typically increase the fair value of the loan, and vice versa. This effect will be significantly more pronounced for a non-government guaranteed loan than a government guaranteed loan.

Prepayment rates
A prepayment rate is the rate at which a loan will be repaid in advance of its expected amortization schedule. Prepayments change the future cash flows of a loan. An increase in the prepayment rate in isolation will result in an increase in fair value when the loan interest rate is lower than the current reinvestment rate, and a decrease in the prepayment rate in isolation will result in a decrease in fair value when the loan interest rate is lower than the current reinvestment rate. Prepayment rates are generally negatively correlated with interest rates.

Recovery and loss severity rates
A recovery rate is an estimation of the amount that can be collected in a loan default scenario. The recovery rate is the recovered amount divided by the loan balance due, expressed as a percentage. The inverse concept of recovery is loss severity. Loss severity rate is an estimation of the loan amount not collected when a loan defaults. The loss severity rate is the loss amount divided by the loan balance due, expressed as a percentage. Generally, an increase in the recovery rate or a decrease in the loss severity rate will increase the loan fair value, and vice versa.

Volatility rates
Volatility measures the potential variability of future prices and is often measured as the standard deviation of price movements. Volatility is an input to option pricing models used to value derivatives and issued structured notes. Volatility is used in valuing equity, interest rate, commodity and foreign exchange options. A higher volatility rate means that the underlying price or rate movements are more likely to occur. Higher volatility rates may increase or decrease an option's fair value depending on the option's terms. The determination of volatility rates is dependent on various factors, including but not limited to, the underlying's market price, the strike price and maturity.

Dividend yields
A dividend yield is the underlying equity's expected dividends expressed as an annual percentage of its price. Dividend yield is used as an input for forward equity price and option models. Higher dividend yields will decrease the forward price, and vice versa. A higher dividend yield will increase or decrease an option's value, depending on the option's terms.

Correlation rates
Correlation is the linear relationship between the movements in two different variables. Correlation is an input to the valuation of derivative contracts and issued structured notes when an instrument's payout is determined by correlated variables. When variables are positively correlated, an increase in one variable will result in an increase in the other variable. When variables are negatively correlated, an increase in one variable will result in a decrease in the other variable. The referenced variables can be within a single asset class or market (equity, interest rate, commodities, credit and foreign exchange) or between variables in different asset classes (equity to foreign exchange, or interest rate to foreign exchange). Changes in correlation will either increase or decrease a financial instrument's fair value depending on the terms of the instrument.

Interest rates
An interest rate is the percentage amount charged on a principal or notional amount. Increasing interest rates will decrease the discounted cash flow value of a financial instrument, and vice versa.

Consumer Price Index swap rates
A CPI swap rate is expressed as a percentage of an increase in the average price of a basket of consumer goods and services, such as transportation, food and medical care. An increase in the CPI swap rate will cause inflation swap payments to be larger, and vice versa.

EV/EBITDA multiples, P/E multiples, EV/Rev multiples, and liquidity discounts
Private equity valuation inputs include EV/EBITDA multiples, P/E multiples and EV/Rev multiples. These are used to calculate either enterprise value or share value of a company based on a multiple of earnings or revenue estimates. Higher multiples equate to higher fair values for all multiple types, and vice versa. A liquidity discount may be applied when few or no transactions exist to support the valuations.

Credit Enhancement
Credit enhancement is an input to the valuation of securitized transaction and is the amount of loan loss protection for a senior tranche. Credit enhancement is expressed as a percentage of the transaction size. An increase in credit enhancement will cause the credit spread to decrease and the tranche fair value to increase, and vice versa.

Interrelationships between unobservable inputs
Unobservable inputs, including the above discount margin, default rate, prepayment rate, and recovery and loss severity rates, may not be independent of each other. For example, the discount margin can be affected by a change in default rate, prepayment rate, or recovery and loss severity rates. Discount margins will generally decrease when default rates decline or when recovery rates increase.

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

The following tables present the changes in fair value measurements on a recurring basis for instruments included in Level 3 of the fair value hierarchy.

	IFRS 9								
	For the year ended October 31, 2018								
(Millions of Canadian dollars)	Fair value at beginning of period (1)	Total realized/ unrealized gains included in earnings	Total unrealized gains included in OCI (2)	Purchases of assets/ issuances of liabilities	Sales of assets/ settlements of liabilities and other (3)	Transfers into Level 3	Transfers out of Level 3	Fair value at end of period	Changes in unrealized gains (losses) included in earnings for assets and liabilities for positions still held
Assets									
Securities									
Trading									
U.S. state, municipal and agencies debt	$ 508	$ 16	$ (3)	$ –	$ (455)	$ –	$ –	$ 66	$ (1)
Asset-backed securities									
Non-CDO securities	196	28	2	–	(116)	–	–	110	1
Corporate debt and other debt	30	(2)	–	–	(2)	–	(5)	21	(1)
Equities	923	(160)	37	395	(170)	125	(2)	1,148	(24)
	1,657	(118)	36	395	(743)	125	(7)	1,345	(25)
Investment									
U.S. state, municipal and agencies debt	–	–	–	–	–	–	–	–	n.a.
Asset-backed securities									
Non-CDO securities	–	–	–	–	–	–	–	–	n.a.
Corporate debt and other debt	29	(30)	6	125	(144)	206	–	192	n.a.
Equities	217	–	20	–	–	–	–	237	n.a.
Loan substitute securities	3	–	–	–	(3)	–	–	–	n.a.
	249	(30)	26	125	(147)	206	–	429	n.a.
Loans	477	(3)	(3)	450	(291)	16	(95)	551	14
Other									
Net derivative balances (4)									
Interest rate contracts	(455)	21	–	67	73	7	(217)	(504)	(3)
Foreign exchange contracts	21	(10)	(4)	11	2	5	(4)	21	(5)
Other contracts	(181)	34	(2)	(88)	(42)	(36)	231	(84)	79
Valuation adjustments	(16)	–	–	–	17	–	–	1	–
Other assets	–	(5)	–	71	(1)	–	–	65	(5)
	$ 1,752	$ (111)	$ 53	$ 1,031	$ (1,132)	$ 323	$ (92)	$ 1,824	$ 55
Liabilities									
Deposits									
Personal	$ (465)	$ (36)	$ (4)	$ (301)	$ 44	$ (431)	$ 803	$ (390)	$ (8)
Business and government	–	–	–	5	–	–	–	5	–
Other									
Obligations related to securities sold short	–	–	–	–	–	–	–	–	–
Other liabilities	(24)	–	(1)	(53)	10	–	–	(68)	4
	$ (489)	$ (36)	$ (5)	$ (349)	$ 54	$ (431)	$ 803	$ (453)	$ (4)

	IAS 39								
	For the year ended October 31, 2017								
(Millions of Canadian dollars)	Fair value at beginning of period	Total realized/ unrealized gains (losses) included in earnings	Total unrealized gains (losses) included in OCI (2)	Purchases of assets/ issuances of liabilities	Sales of assets/ settlements of liabilities and other (3)	Transfers into Level 3	Transfers out of Level 3	Fair value at end of period	Changes in unrealized gains (losses) included in earnings for assets and liabilities for positions still held
Assets									
Securities									
Trading									
U.S. state, municipal and agencies debt	$ 1	$ –	$ –	$ –	$ (1)	$ –	$ –	$ –	$ –
Asset-backed securities									
Non-CDO securities	4	–	–	7	(10)	–	(1)	–	–
Corporate debt and other debt	62	(4)	1	52	(68)	20	(34)	29	(3)
Equities	376	(143)	(18)	275	(81)	17	(1)	425	(119)
	443	(147)	(17)	334	(160)	37	(36)	454	(122)
Investment									
U.S. state, municipal and agencies debt	747	(5)	(19)	–	(215)	–	–	508	n.a.
Asset-backed securities									
Non-CDO securities	217	–	7	–	(21)	–	–	203	n.a.
Corporate debt and other debt	956	(1)	(34)	119	(55)	–	(188)	797	n.a.
Equities	756	62	45	45	(197)	–	–	711	n.a.
Loan substitute securities	–	–	–	4	–	–	–	4	n.a.
	2,676	56	(1)	168	(488)	–	(188)	2,223	n.a.
Loans	329	(5)	(5)	405	(512)	–	(33)	179	–
Other									
Net derivative balances (4)									
Interest rate contracts	(448)	49	(20)	33	(2)	4	(71)	(455)	74
Foreign exchange contracts	(15)	49	2	(3)	(7)	1	(6)	21	17
Other contracts	(122)	80	2	(76)	2	(58)	(9)	(181)	52
Valuation adjustments	(10)	–	–	–	(6)	–	–	(16)	–
Other assets	–	–	–	–	–	–	–	–	–
	$ 2,853	$ 82	$ (39)	$ 861	$ (1,173)	$ (16)	$ (343)	$ 2,225	$ 21
Liabilities									
Deposits									
Personal	$ (425)	$ (20)	$ 14	$ (387)	$ 85	$ (277)	$ 545	$ (465)	$ 5
Business and government	(2)	–	–	–	–	–	2	–	–
Other									
Obligations related to securities sold short	(1)	–	–	–	1	–	–	–	–
Other liabilities	(88)	(4)	2	–	66	–	–	(24)	–
	$ (516)	$ (24)	$ 16	$ (387)	$ 152	$ (277)	$ 547	$ (489)	$ 5

(1) These amounts reflect certain reclassifications made upon adoption of IFRS 9. Refer to Note 2 for further details.

(2) These amounts include the foreign currency translation gains or losses arising on consolidation of foreign subsidiaries relating to the Level 3 instruments, where applicable. The unrealized gains on Investment securities recognized in OCI were $33 million for the year ended October 31, 2018 (October 31, 2017 – gains of $84 million) excluding the translation gains or losses arising on consolidation.

(3) Other includes amortization of premiums or discounts recognized in net income.

(4) Net derivatives as at October 31, 2018 included derivative assets of $577 million (October 31, 2017 – $747 million) and derivative liabilities of $1,143 million (October 31, 2017 – $1,378 million).

n.a. not applicable

Transfers between fair value hierarchy levels for instruments carried at fair value on a recurring basis

Transfers between Level 1 and Level 2, and transfers into and out of Level 3 are assumed to occur at the end of the period. For an asset or a liability that transfers into Level 3 during the period, the entire change in fair value for the period is excluded from the Total realized/unrealized gains (losses) included in earnings column of the above reconciliation, whereas for transfers out of Level 3 during the period, the entire change in fair value for the period is included in the same column of the above reconciliation.

Transfers between Level 1 and 2 are dependent on whether fair value is obtained on the basis of quoted market prices in active markets (Level 1).

During the year ended October 31, 2018, transfers out of Level 1 to Level 2 included $529 million of Trading U.S. state, municipal and agencies debt and $809 million of Obligations related to securities sold short. During the year ended October 31, 2017, transfers out of Level 1 to Level 2 included $1,143 million of Trading U.S. state, municipal and agencies debt and $1,472 million of Obligations related to securities sold short.

During the year ended October 31, 2018, transfers out of Level 2 to Level 1 included $65 million of Trading U.S. state, municipal and agencies debt and $96 million of Obligations related to securities sold short. During the year ended October 31, 2017, transfers out of Level 2 to Level 1 included $339 million of Trading U.S. state, municipal and agencies debt and $80 million of Obligations related to securities sold short.

Transfers between Level 2 and Level 3 are primarily due to either a change in the market observability for an input, or a change in an unobservable input's significance to a financial instrument's fair value.

During the year ended October 31, 2018, significant transfers out of Level 2 to Level 3 included $125 million of Trading Equities due to unobservable inputs to their fair values, $206 million of Corporate debt and other debt due to changes in the market observability of inputs, and $431 million of Personal deposits due to changes in the significance of unobservable inputs to their fair values. During the year ended October 31, 2017, significant transfers out of Level 2 to Level 3 included $277 million of Personal deposits. In addition, during the year ended October 31, 2017, significant transfers out of Level 2 to Level 3 included $11 million of OTC equity options in Other contracts comprised of $94 million of derivative related assets and $105 million of derivative related liabilities.

During the year ended October 31, 2018, significant transfers out of Level 3 to Level 2 included $217 million of interest rate swaps in Interest rate contracts comprised of $244 million of derivative related assets and $27 million of derivative related liabilities due to changes in the market observability of inputs, and $231 million of OTC equity options in Other contracts comprised of $703 million of derivative related assets and $934 million of derivative related liabilities due to changes in the market observability of inputs. In addition, during the year ended October 31, 2018, significant transfers out of Level 3 to Level 2 included $803 million of Personal deposits due to changes in the significance of unobservable inputs to their fair values. During the year ended October 31, 2017, significant transfers out of Level 3 to Level 2 included $188 million of AFS Corporate debt and other debt, and $545 million of Personal deposits. In addition, during the year ended October 31, 2017, significant transfers out of Level 3 to Level 2 included $52 million of OTC equity options in Other contracts comprised of $321 million of derivative related assets and $269 million of derivative related liabilities.

Positive and negative fair value movements of Level 3 financial instruments from using reasonably possible alternative assumptions

A financial instrument is classified as Level 3 in the fair value hierarchy if one or more of its unobservable inputs may significantly affect the measurement of its fair value. In preparing the financial statements, appropriate levels for these unobservable input parameters are chosen so that they are consistent with prevailing market evidence or management judgment. Due to the unobservable nature of the prices or rates, there may be uncertainty about the valuation of these Level 3 financial instruments.

The following table summarizes the impacts to fair values of Level 3 financial instruments using reasonably possible alternative assumptions. This sensitivity disclosure is intended to illustrate the potential impact of the relative uncertainty in the fair value of Level 3 financial instruments. In reporting the sensitivities below, we offset balances in instances where: (i) the move in valuation factors cause an offsetting positive and negative fair value movement, (ii) both offsetting instruments are in Level 3, and (iii) exposures are managed and reported on a net basis. With respect to overall sensitivity, it is unlikely in practice that all reasonably possible alternative assumptions would simultaneously be realized.

	IFRS 9			IAS 39		
	As at					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars)	Level 3 fair value	Positive fair value movement from using reasonably possible alternatives	Negative fair value movement from using reasonably possible alternatives	Level 3 fair value	Positive fair value movement from using reasonably possible alternatives	Negative fair value movement from using reasonably possible alternatives
Securities						
Trading						
U.S. state, municipal and agencies debt	$ 66	$ –	$ (1)	$ –	$ –	$ –
Asset-backed securities	110	7	(10)	–	–	–
Corporate debt and other debt	21	–	–	29	–	–
Equities	1,148	12	(12)	425	–	–
Investment						
U.S. state, municipal and agencies debt	–	–	–	508	8	(20)
Asset-backed securities	–	–	–	203	15	(21)
Corporate debt and other debt	192	19	(16)	797	6	(6)
Equities	237	24	(26)	711	40	(24)
Loan substitute securities	–	–	–	4	2	–
Loans	551	5	(7)	179	2	(3)
Derivatives	577	20	(18)	747	34	(30)
Other assets	65	–	–	–	–	–
	$ 2,967	$ 87	$ (90)	$ 3,603	$ 107	$ (104)
Deposits	$ (385)	$ 12	$ (11)	$ (465)	$ 11	$ (11)
Derivatives	(1,143)	47	(54)	(1,378)	37	(48)
Other						
Other liabilities	(68)	–	–	(24)	–	–
	$ (1,596)	$ 59	$ (65)	$ (1,867)	$ 48	$ (59)

Sensitivity results

As at October 31, 2018, the effects of applying other reasonably possible alternative assumptions to the Level 3 asset positions would be an increase of $87 million and a decrease of $90 million in fair value, of which $24 million and $26 million would be recorded in Other components of equity, respectively. The effects of applying these assumptions to the Level 3 liability positions would result in a decrease of $59 million and an increase of $65 million in fair value.

Level 3 valuation inputs and approaches to developing reasonably possible alternative assumptions

The following is a summary of the unobservable inputs used in the valuation of the Level 3 instruments and our approaches to developing reasonably possible alternative assumptions used to determine sensitivity.

Financial assets or liabilities	Sensitivity methodology
Asset-backed securities, corporate debt, government debt, municipal bonds and loans	Sensitivities are determined based on adjusting, plus or minus one standard deviation, the bid-offer spreads or input prices if a sufficient number of prices are received, adjusting input parameters such as credit spreads or using high and low vendor prices as reasonably possible alternative assumptions.
Auction rate securities	Sensitivity of ARS is determined by decreasing the discount margin between 15% and 28% and increasing the discount margin between 30% and 45%, depending on the specific reasonable range of fair value uncertainty for each particular financial instrument's market. Changes to the discount margin reflect historical monthly movements in the student loan asset-backed securities market.
Private equities, hedge fund investments and related equity derivatives	Sensitivity of direct private equity investments is determined by (i) adjusting the discount rate by 2% when the discounted cash flow method is used to determine fair value, (ii) adjusting the price multiples based on the range of multiples of comparable companies when price-based models are used, or (iii) using an alternative valuation approach. Net asset values of the private equity funds, hedge funds and related equity derivatives are provided by the fund managers, and as a result, there are no other reasonably possible alternative assumptions for these investments.
Interest rate derivatives	Sensitivities of interest rate and cross currency swaps are derived using plus or minus one standard deviation of the inputs, and an amount representing model and parameter uncertainty, where applicable.
Equity derivatives	Sensitivity of the Level 3 position is determined by shifting the unobservable model inputs by plus or minus one standard deviation of the pricing service market data including volatility, dividends or correlations, as applicable.
Bank funding and deposits	Sensitivities of deposits are calculated by shifting the funding curve by plus or minus certain basis points.
Structured notes	Sensitivities for interest-rate-linked and equity-linked structured notes are derived by adjusting inputs by plus or minus one standard deviation, and for other deposits, by estimating a reasonable move in the funding curve by plus or minus certain basis points.

Fair value for financial instruments that are carried at amortized cost and classified using the fair value hierarchy

	IFRS 9					
	As at October 31, 2018					
		Fair value may not approximate carrying value				
	Fair value always approximates	Fair value measurements using				Total
(Millions of Canadian dollars)	carrying value (1)	Level 1	Level 2	Level 3	Total	fair value
Interest-bearing deposits with banks	$ 16,197	$ –	$ –	$ –	$ –	$ 16,197
Amortized cost securities (2)	–	470	44,897	–	45,367	45,367
Assets purchased under reverse repurchase agreements and securities borrowed	57,099	–	18,391	–	18,391	75,490
Loans						
Retail	65,847	–	323,114	5,090	328,204	394,051
Wholesale	8,889	–	154,781	4,417	159,198	168,087
	74,736	–	477,895	9,507	487,402	562,138
Other assets	45,559	–	480	166	646	46,205
	$ 193,591	$ 470	$ 541,663	$ 9,673	$ 551,806	$ 745,397
Deposits						
Personal	$ 184,887	$ –	$ 69,606	$ 622	$ 70,228	$ 255,115
Business and government	270,349	–	160,010	799	160,809	431,158
Bank	15,218	–	10,235	9	10,244	25,462
	470,454	–	239,851	1,430	241,281	711,735
Obligations related to assets sold under repurchase agreements and securities loaned	4,264	–	712	–	712	4,976
Other liabilities	45,346	–	406	9,128	9,534	54,880
Subordinated debentures	–	–	9,260	59	9,319	9,319
	$ 520,064	$ –	$ 250,229	$ 10,617	$ 260,846	$ 780,910

	IAS 39					
	As at October 31, 2017					
		Fair value may not approximate carrying value				
	Fair value always approximates	Fair value measurements using				Total
(Millions of Canadian dollars)	carrying value (1)	Level 1	Level 2	Level 3	Total	fair value
Interest-bearing deposits with banks	$ 11,880	$ –	$ 30	$ –	$ 30	$ 11,910
Held-to-maturity securities (2)	–	–	14,754	17	14,771	14,771
Assets purchased under reverse repurchase agreements and securities borrowed	58,605	–	23,394	–	23,394	81,999
Loans						
Retail	65,991	–	309,855	4,936	314,791	380,782
Wholesale	8,930	–	139,128	5,909	145,037	153,967
	74,921	–	448,983	10,845	459,828	534,749
Other assets	43,963	–	433	202	635	44,598
	$ 189,369	$ –	$ 487,594	$ 11,064	$ 498,658	$ 688,027
Deposits						
Personal	$ 182,440	$ –	$ 62,981	$ 726	$ 63,707	$ 246,147
Business and government	261,898	–	149,618	979	150,597	412,495
Bank	16,615	–	5,079	14	5,093	21,708
	460,953	–	217,678	1,719	219,397	680,350
Obligations related to assets sold under repurchase agreements and securities loaned	7,774	–	1,364	–	1,364	9,138
Other liabilities	43,733	–	311	5,382	5,693	49,426
Subordinated debentures	–	–	9,504	55	9,559	9,559
	$ 512,460	$ –	$ 228,857	$ 7,156	$ 236,013	$ 748,473

(1) Certain financial instruments have not been assigned to a level as the carrying amount always approximates their fair values due to their short-term nature (instruments that are receivable or payable on demand, or with original maturity of three months or less) and insignificant credit risk.
(2) Included in Securities – Investment, net of applicable allowance on the Consolidated Balance Sheets.

Fair values of financial assets and liabilities carried at amortized cost and disclosed in the table above are determined using the following valuation techniques and inputs.

Amortized cost securities (Held to maturity under IAS 39)
Fair values of government bonds, corporate bonds, and ABS are based on quoted prices. Fair values of certain Non-OECD government bonds are based on vendor prices or the discounted cash flow method with yield curves of other countries' government bonds as inputs. For ABS, where market prices are not available, the fair value is determined using the discounted cash flow method. The inputs to the valuation model generally include market interest rates, spreads and yields derived from comparable securities, prepayment, and loss given default.

Assets purchased under reverse repurchase agreements and securities borrowed, and Obligations related to assets sold under repurchase agreements and securities loaned
Valuation methods used for the long-term instruments are described in the Fair value of assets and liabilities measured on a recurring basis and classified using the fair value hierarchy section of this note. The carrying values of short-term instruments generally approximate their fair values.

Loans – Retail
Retail loans include residential mortgages, personal and small business loans and credit cards. For residential mortgages, and personal and small business loans, we segregate the portfolio based on certain attributes such as product type, contractual interest rate, term to maturity and credit scores, if applicable. Fair values of these loans are determined by the discounted cash flow method using applicable inputs such as prevailing interest rates, contractual and posted client rates, client discounts, credit spreads, prepayment rates and loan-to-value ratios. Fair values of credit card receivables are also calculated based on a discounted cash flow method with portfolio yields, write-offs and monthly payment rates as inputs. The carrying values of short-term and variable rate loans generally approximate their fair values.

Loans – Wholesale
Wholesale loans include Business, Bank and Sovereign loans. Where market prices are available, loans are valued based on market prices. Otherwise, fair value is determined by the discounted cash flow method using the following inputs: market interest rates and market based spreads of assets with similar credit ratings and terms to maturity, loss given default, expected default frequency implied from credit default swap prices, if available, and relevant pricing information such as contractual rate, origination and maturity dates, redemption price, coupon payment frequency and date convention.

Deposits
Deposits are comprised of demand, notice, and term deposits which include senior deposit notes we have issued to provide us with long-term funding. Fair values of term deposits are determined by one of several valuation techniques: (i) for term deposits and similar instruments, we segregate the portfolio based on term to maturity. Fair values of these instruments are determined by the discounted cash flow method using inputs such as client rates for new sales of the corresponding terms; and (ii) for senior deposit notes, we use actual traded prices, vendor prices or the discounted cash flow method using a market interest rate curve and our funding spreads as inputs. The carrying values of demand, notice, and short-term term deposits generally approximate their fair values.

Other assets and Other liabilities
Other assets and Other liabilities include receivables and payables relating to certain commodities. Fair values of the commodity receivables and payables are calculated by the discounted cash flow method using applicable inputs such as market interest rates, counterparties' credit spreads, our funding spreads, commodity forward prices and spot prices.

Subordinated debentures
Fair values of Subordinated debentures are based on market prices, dealer quotes or vendor prices when available. Where prices cannot be observed, fair value is determined using the discounted cash flow method, with applicable inputs such as market interest rates and credit spreads.

Carrying value of securities

	IFRS 9						
	As at October 31, 2018						
	Term to maturity (1)					With no specific maturity	
(Millions of Canadian dollars)	Within 3 months	3 months to 1 year	1 year to 5 years	5 years to 10 years	Over 10 years		Total
Trading (2)							
Canadian government debt	$ 1,860	$ 7,237	$ 7,983	$ 2,244	$ 6,599	$ –	$ 25,923
U.S. state, municipal and agencies debt	595	3,715	9,836	5,119	13,899	–	33,164
Other OECD government debt	1,367	3,932	3,456	635	779	–	10,169
Mortgage-backed securities	–	–	114	93	794	–	1,001
Asset-backed securities	126	14	215	369	409	–	1,133
Corporate debt and other debt							
Bankers' acceptances	326	–	–	–	–	–	326
Certificates of deposit	300	84	48	3	25	–	460
Other (3)	2,120	4,058	6,720	3,099	5,543	–	21,540
Equities	–	–	–	–	–	34,542	34,542
	6,694	19,040	28,372	11,562	28,048	34,542	128,258
Fair value through other comprehensive income (2)							
Canadian government debt							
Federal							
Amortized cost	–	–	173	15	56	–	244
Fair value	–	–	169	15	54	–	238
Yield (4)	–	–	1.7%	1.8%	4.5%	–	2.3%
Provincial and municipal							
Amortized cost	–	51	673	236	618	–	1,578
Fair value	–	51	672	234	597	–	1,554
Yield (4)	–	1.7%	2.9%	2.0%	4.0%	–	3.1%
U.S. state, municipal and agencies debt							
Amortized cost	1,355	132	2,766	635	13,112	–	18,000
Fair value	1,355	131	2,768	643	13,239	–	18,136
Yield (4)	2.4%	2.1%	2.3%	3.2%	3.0%	–	2.8%
Other OECD government debt							
Amortized cost	225	86	1,090	67	1	–	1,469
Fair value	225	86	1,091	67	1	–	1,470
Yield (4)	0.6%	2.4%	2.3%	1.4%	4.2%	–	2.0%
Mortgage-backed securities							
Amortized cost	–	–	59	193	1,924	–	2,176
Fair value	–	–	59	193	1,922	–	2,174
Yield (4)	–	–	1.6%	3.4%	2.9%	–	2.9%
Asset-backed securities							
Amortized cost	–	–	–	2,662	4,442	–	7,104
Fair value	–	–	–	2,657	4,445	–	7,102
Yield (4)	–	–	–	3.6%	3.4%	–	3.4%
Corporate debt and other debt							
Amortized cost	4,119	1,769	10,785	399	367	–	17,439
Fair value	4,120	1,772	10,783	390	354	–	17,419
Yield (4)	1.5%	1.8%	2.0%	3.0%	4.1%	–	1.9%
Equities							
Cost	–	–	–	–	–	197	197
Fair value (5)	–	–	–	–	–	382	382
Loan substitute securities							
Cost	–	–	–	–	–	25	25
Fair value	–	–	–	–	–	24	24
Yield (4)	–	–	–	–	–	5.7%	5.7%
Amortized cost	5,699	2,038	15,546	4,207	20,520	222	48,232
Fair value	5,700	2,040	15,542	4,199	20,612	406	48,499
Amortized Cost (2)							
Canadian government debt	1,762	1,427	10,863	2,381	–	–	16,433
U.S. state, municipal and agencies debt	69	115	2,231	2,177	9,736	–	14,328
Other OECD government debt	2,601	1,386	2,800	–	–	–	6,787
Asset-backed securities	–	5	1,035	29	–	–	1,069
Corporate debt and other debt	253	1,434	5,566	161	78	–	7,492
Amortized cost, net of allowance	4,685	4,367	22,495	4,748	9,814	–	46,109
Fair value	4,687	4,360	22,286	4,635	9,399	–	45,367
Total carrying value of securities	$ 17,079	$ 25,447	$ 66,409	$ 20,509	$ 58,474	$ 34,948	$ 222,866

(Millions of Canadian dollars)	IAS 39 As at October 31, 2017 Term to maturity (1) Within 3 months	3 months to 1 year	1 year to 5 years	5 years to 10 years	Over 10 years	With no specific maturity	Total
Trading (2)							
Canadian government debt	$ 1,757	$ 11,362	$ 8,047	$ 1,447	$ 6,112	$ –	$ 28,725
U.S. state, municipal and agencies debt	3,527	2,031	4,685	4,145	16,472	–	30,860
Other OECD government debt	834	4,846	4,843	260	571	–	11,354
Mortgage-backed securities	–	–	67	22	1,209	–	1,298
Asset-backed securities	85	63	249	162	173	–	732
Corporate debt and other debt							
Bankers' acceptances	246	–	–	–	–	–	246
Certificates of deposit	28	22	67	4	5	–	126
Other (3)	2,625	5,038	6,010	2,784	4,907	–	21,364
Equities	–	–	–	–	–	32,952	32,952
	9,102	23,362	23,968	8,824	29,449	32,952	127,657
Available-for-sale (2)							
Canadian government debt							
Federal							
Amortized cost	5	–	1,528	17	58	–	1,608
Fair value	5	–	1,521	17	58	–	1,601
Yield (4)	1.7%	–	0.9%	1.8%	4.3%	–	1.1%
Provincial and municipal							
Amortized cost	25	71	1,838	41	539	–	2,514
Fair value	25	71	1,836	40	531	–	2,503
Yield (4)	1.6%	2.0%	2.1%	2.8%	4.1%	–	2.5%
U.S. state, municipal and agencies debt							
Amortized cost	1,284	2,768	1,087	1,723	22,615	–	29,477
Fair value	1,284	2,765	1,085	1,720	22,661	–	29,515
Yield (4)	1.2%	1.6%	1.5%	3.0%	2.7%	–	2.5%
Other OECD government debt							
Amortized cost	824	2,367	5,894	60	–	–	9,145
Fair value	824	2,367	5,901	60	–	–	9,152
Yield (4)	0.4%	1.0%	1.5%	1.1%	–	–	1.3%
Mortgage-backed securities							
Amortized cost	–	–	–	15	919	–	934
Fair value	–	–	–	15	919	–	934
Yield (4)	–	–	–	2.9%	2.2%	–	2.3%
Asset-backed securities							
Amortized cost	960	67	688	3,030	1,774	–	6,519
Fair value	956	67	690	3,039	1,745	–	6,497
Yield (4)	1.2%	1.6%	1.6%	2.6%	2.4%	–	2.2%
Corporate debt and other debt							
Amortized cost	3,332	2,917	17,006	461	680	–	24,396
Fair value	3,336	2,918	17,060	464	681	–	24,459
Yield (4)	1.3%	1.5%	1.8%	2.8%	4.6%	–	1.8%
Equities							
Cost	–	–	–	–	–	875	875
Fair value	–	–	–	–	–	1,188	1,188
Loan substitute securities							
Cost	–	–	–	–	–	29	29
Fair value	–	–	–	–	–	28	28
Yield (4)	–	–	–	–	–	4.3%	4.3%
Amortized cost	6,430	8,190	28,041	5,347	26,585	904	75,497
Fair value	6,430	8,188	28,093	5,355	26,595	1,216	75,877
Amortized Cost (2)							
Amortized cost	9	54	5,960	4,754	4,068	–	14,845
Fair value	9	54	5,941	4,761	4,006	–	14,771
Total carrying value of securities	$ 15,541	$ 31,604	$ 58,021	$ 18,933	$ 60,112	$ 34,168	$ 218,379

(1) Actual maturities may differ from contractual maturities shown above as borrowers may have the right to extend or prepay obligations with or without penalties.
(2) Trading securities and FVOCI securities (Available-for-sale securities under IAS 39) are recorded at fair value. Amortized cost securities, included in Investment securities (Held-to-maturity under IAS 39), are recorded at amortized cost, and under IFRS 9 are presented net of allowance for credit losses.
(3) Primarily composed of corporate debt, supra-national debt, and commercial paper.
(4) The weighted average yield is derived using the contractual interest rate and the carrying value at the end of the year for the respective securities.
(5) Certain equity securities that are not held-for-trading purposes are designated as FVOCI. For the year ended October 31, 2018, we disposed of $8 million of equity securities measured at FVOCI. The cumulative loss on the date of disposals was $1 million.

Unrealized gains and losses on securities at fair value through other comprehensive income (1) (2) (3)

	IFRS 9			
	As at October 31, 2018			
(Millions of Canadian dollars)	Cost/ Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Canadian government debt				
Federal	$ 244	$ –	$ (6)	$ 238
Provincial and municipal	1,578	2	(26)	1,554
U.S. state, municipal and agencies debt (4)	18,000	285	(149)	18,136
Other OECD government debt	1,469	2	(1)	1,470
Mortgage-backed securities	2,176	1	(3)	2,174
Asset-backed securities				
CDO	6,248	1	(10)	6,239
Non-CDO securities	856	9	(2)	863
Corporate debt and other debt	17,439	22	(42)	17,419
Equities	197	186	(1)	382
Loan substitute securities	25	–	(1)	24
	$ 48,232	$ 508	$ (241)	$ 48,499

Unrealized gains and losses on available-for-sale securities (1) (2)

	IAS 39			
	As at October 31, 2017			
(Millions of Canadian dollars)	Cost/ Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Canadian government debt				
Federal	$ 1,608	$ 2	$ (9)	$ 1,601
Provincial and municipal	2,514	7	(18)	2,503
U.S. state, municipal and agencies debt (4)	29,477	242	(204)	29,515
Other OECD government debt	9,145	18	(11)	9,152
Mortgage-backed securities	934	1	(1)	934
Asset-backed securities				
CDO	3,610	13	–	3,623
Non-CDO securities	2,909	10	(45)	2,874
Corporate debt and other debt	24,396	106	(43)	24,459
Equities	875	320	(7)	1,188
Loan substitute securities	29	–	(1)	28
	$ 75,497	$ 719	$ (339)	$ 75,877

(1) The majority of the MBS are residential. Cost/Amortized cost, gross unrealized gains, gross unrealized losses and fair value related to commercial MBS are $1,442 million, $nil, $6 million and $1,436 million, respectively as at October 31, 2018 (October 31, 2017 – $727 million, $1 million, $1 million and $727 million, respectively).
(2) Excludes $46,109 million of held-to-collect securities as at October 31, 2018 that are carried at amortized cost, net of allowance for credit losses (October 31, 2017 – $14,845 million of held-to-maturity securities that are carried at amortized cost).
(3) Gross unrealized gains and losses includes $11 million of allowance for credit losses on debt securities at FVOCI as at October 31, 2018 recognized in income and Other components of equity.
(4) Includes securities issued by U.S. non-agency entities backed by government insured assets, MBS and asset-backed securities issued by U.S. government agencies.

Allowance for credit losses on investment securities

The following tables reconcile the opening and closing allowance for debt securities at FVOCI and amortized cost by stage. Reconciling items include the following:

- Transfers between stages, which are presumed to occur before any corresponding remeasurement of the allowance.
- Purchases and originations, which reflect the allowance related to assets newly recognized during the period, including those assets that were derecognized following a modification of terms.
- Derecognitions and maturities, which reflect the allowance related to assets derecognized during the period without a credit loss being incurred, including those assets that were derecognized following a modification of terms.
- Remeasurements, which comprise the impact of changes in model inputs or assumptions, including changes in forward-looking macroeconomic conditions and partial repayments; changes in the measurement following a transfer between stages; and unwinding of the time value discount due to the passage of time.

During the year ended October 31, 2018, there were no significant changes to the models used to estimate expected credit losses.

Allowance for credit losses – securities at FVOCI (1)

	IFRS 9			
	For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 3	$ 22	$ –	$ 25
Provision for credit losses				
Transfers in (out) to Stage 1	5	(5)	–	–
Transfers in (out) to Stage 2	–	–	–	–
Transfers in (out) to Stage 3	(36)	–	36	–
Purchases and originations	85	–	–	85
Derecognitions and maturities	(47)	(17)	25	(39)
Remeasurements	(8)	7	–	(1)
Write-offs	–	–	(62)	(62)
Exchange rate and other	2	–	1	3
Balance at end of period	$ 4	$ 7	$ –	$ 11

(1) Expected credit losses on debt securities at FVOCI are not separately recognized on the balance sheet as the related securities are recorded at fair value. The cumulative amount of credit losses recognized in profit or loss is presented in Other components of equity.

Allowance for credit losses – securities at amortized cost

	IFRS 9			
	For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 9	$ 45	$ –	$ 54
Provision for credit losses				
Transfers in (out) to Stage 1	3	(3)	–	–
Transfers in (out) to Stage 2	(7)	7	–	–
Transfers in (out) to Stage 3	–	(2)	2	–
Purchases and originations	5	–	–	5
Derecognitions and maturities	(3)	(11)	–	(14)
Remeasurements	(2)	(3)	–	(5)
Write-offs	–	–	(2)	(2)
Exchange rate and other	1	(1)	–	–
Balance at end of period	$ 6	$ 32	$ –	$ 38

Credit risk exposure by internal risk rating

The following table presents the fair value of debt securities at FVOCI and the gross carrying amount of securities at amortized cost. Risk ratings are based on internal ratings as at the reporting date as outlined in the internal ratings maps in the Credit Risk section of Management's Discussion and Analysis.

	IFRS 9			
	As at October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3 (1)	Total
Investment securities				
Securities at FVOCI				
Investment grade	$ 46,956	$ 479	$ –	$ 47,435
Non-investment grade	500	33	–	533
Impaired	–	–	125	125
	47,456	512	125	48,093
Items not subject to impairment (2)				406
				48,499
Securities at amortized cost				
Investment grade	44,958	119	–	45,077
Non-investment grade	367	703	–	1,070
Impaired	–	–	–	–
	45,325	822	–	46,147
Allowance for credit losses	6	32	–	38
Amortized cost	$ 45,319	$ 790	$ –	$ 46,109

(1) Includes $125 million of purchased credit impaired securities of which $67 million represents expected credit losses recorded on initial recognition.
(2) Investment securities at FVOCI not subject to impairment represent equity securities designated as FVOCI.

Impairment of available-for-sale securities (IAS 39)

AFS securities were assessed for objective evidence of impairment at each reporting date and more frequently when conditions warrant. Depending on the nature of the securities under review, we applied specific methodologies to assess whether the cost/amortized cost of the security would be recovered. As at October 31, 2017, our gross unrealized losses on AFS securities were $339 million. There was no objective evidence of impairment on our AFS securities that were in an unrealized loss position as at October 31, 2017.

Net gains and losses on available-for-sale securities (1)

(Millions of Canadian dollars)	IAS 39 For the year ended October 31, 2017
Realized gains	$ 246
Realized losses	(22)
Impairment losses	(52)
	$ 172

(1) The following related to our insurance operations were excluded from Net gains and losses on AFS securities and were included in Insurance premiums, investment and fee income in the Consolidated Statements of Income for the year ended October 31, 2017: Realized gains of $23 million, realized losses of $1 million and $nil in impairment losses.

During the year ended October 31, 2017, $172 million of net gains were recognized in Non-interest income. Net realized gains of $224 million were mainly comprised of distributions from, and gains on sales of certain Equities, Other OECD government debt, and Loan substitute securities. Also included in the net gains were $52 million of impairment losses primarily on certain Equities and U.S. state, municipal and agencies debt.

Held-to-maturity securities (IAS 39)

Held-to-maturity securities measured at amortized cost were subject to periodic impairment review and were classified as impaired when, in management's opinion, there was no longer reasonable assurance of the timely collection of the full amount of principal and interest. The impairment review of held-to-maturity securities was primarily based on the impairment model for loans. As at October 31, 2017, there was no objective evidence of impairment on our held-to-maturity securities.

Financial instruments reclassified in prior periods

	IAS 39	
	As at October 31, 2017	
(Millions of Canadian dollars)	Carrying value	Fair value
Financial assets – Available-for-sale reclassified to loans and receivables (1) (2)		
Canadian government debt – Federal	$ 2,747	$ 2,737
Financial assets – Available-for-sale reclassified to held-to-maturity (1)		
Canadian government debt – Federal	3,674	3,645
	$ 6,421	$ 6,382

(1) On October 1, 2015, we reclassified $4,132 million and $5,240 million, respectively, of certain debt securities from classified as AFS to loans and receivables, and from classified as AFS to held-to-maturity.

(2) During the year ended October 31, 2016, we reclassified $897 million of certain debt securities from classified as AFS to loans and receivables.

The following table provides the amounts recorded in net income and OCI from the debt securities after the reclassification.

	IAS 39	
	For the year ended October 31, 2017	
(Millions of Canadian dollars)	Unrealized gains (losses) during the period (1)	Interest income/ gains (losses) recognized in net income during the period
Available-for-sale reclassified to loans and receivables (2)		
Canadian government debt – Federal	$ (15)	$ 56
Available-for-sale reclassified to held-to-maturity (2)		
Canadian government debt – Federal	(77)	128
	$ (92)	$ 184

(1) This represents the unrealized gains or losses that would have been recognized in profit or loss (for reclassifications from FVTPL) or OCI (for reclassifications from AFS) had the assets not been reclassified.

(2) Interest income/gains (losses) recognized in net income during the period includes amortization of net unrealized gains associated with reclassified assets that were included in Other components of equity on the date of reclassification.

Note 5 Loans and allowance for credit losses

Loans by geography and portfolio net of allowance

	IFRS 9					
	As at October 31, 2018					
(Millions of Canadian dollars)	Canada	United States	Other International	Total	Allowance for losses (1)	Total net of allowance
Retail (2)						
Residential mortgages	$ 265,831	$ 13,493	$ 3,147	$ 282,471	$ (382)	$ 282,089
Personal	82,112	7,172	3,416	92,700	(841)	91,859
Credit cards (3)	18,793	368	254	19,415	(725)	18,690
Small business (4)	4,866	–	–	4,866	(49)	4,817
Wholesale (2)						
Business, Sovereign and Bank (5), (6), (7)	103,069	59,442	17,767	180,278	(915)	179,363
Total loans	$ 474,671	$ 80,475	$ 24,584	$ 579,730	$ (2,912)	$ 576,818
Undrawn loan commitments – Retail	199,395	609	1,250	201,254	(90)	
Undrawn loan commitments – Wholesale	96,146	173,308	53,797	323,251	(64)	

	IAS 39			
	As at October 31, 2017			
(Millions of Canadian dollars)	Canada	United States	Other International	Total
Retail (2)				
Residential mortgages	$ 255,799	$ 11,449	$ 3,100	$ 270,348
Personal	82,022	6,357	3,915	92,294
Credit cards (3)	17,491	294	250	18,035
Small business (4)	4,493	–	–	4,493
	359,805	18,100	7,265	385,170
Wholesale (2)				
Business (5)	74,425	51,556	20,310	146,291
Bank (6)	1,027	2,498	437	3,962
Sovereign (7)	7,370	934	1,049	9,353
	82,822	54,988	21,796	159,606
Total loans	442,627	73,088	29,061	544,776
Allowance for loan losses	(1,406)	(234)	(519)	(2,159)
Total loans net of allowance for loan losses	$ 441,221	$ 72,854	$ 28,542	$ 542,617

(1) Excludes allowance for loans measured at FVOCI of $1 million under IFRS 9.
(2) Geographic information is based on residence of borrower.
(3) The credit cards business is managed as a single portfolio and includes both consumer and business cards.
(4) Includes small business exposure managed on a pooled basis.
(5) Includes small business exposure managed on an individual client basis.
(6) Bank refers primarily to regulated deposit-taking institutions and securities firms.
(7) Sovereign refers to all central governments and agencies, central banks, as well as other qualifying public sector entities and multilateral development banks.

Loans maturity and rate sensitivity

	IFRS 9							
	As at October 31, 2018							
	Maturity term (1)				Rate sensitivity			
(Millions of Canadian dollars)	Under 1 year (2)	1 to 5 years	Over 5 years	Total	Floating	Fixed Rate	Non-rate-sensitive	Total
Retail	$ 217,188	$ 163,291	$ 18,973	$ 399,452	$ 123,826	$ 268,793	$ 6,833	$ 399,452
Wholesale	144,208	27,789	8,281	180,278	31,016	147,970	1,292	180,278
Total loans	$ 361,396	$ 191,080	$ 27,254	$ 579,730	$ 154,842	$ 416,763	$ 8,125	$ 579,730
Allowance for loan losses				(2,912)				(2,912)
Total loans net of allowance for loan losses				$ 576,818				$ 576,818

	IAS 39							
	As at October 31, 2017							
	Maturity term (1)				Rate sensitivity			
(Millions of Canadian dollars)	Under 1 year (2)	1 to 5 years	Over 5 years	Total	Floating	Fixed Rate	Non-rate-sensitive	Total
Retail	$ 202,221	$ 165,337	$ 17,612	$ 385,170	$ 112,299	$ 267,124	$ 5,747	$ 385,170
Wholesale	123,570	27,907	8,129	159,606	21,202	136,111	2,293	159,606
Total loans	$ 325,791	$ 193,244	$ 25,741	$ 544,776	$ 133,501	$ 403,235	$ 8,040	$ 544,776
Allowance for loan losses				(2,159)				(2,159)
Total loans net of allowance for loan losses				$ 542,617				$ 542,617

(1) Generally, based on the earlier of contractual repricing or maturity date.
(2) Includes variable rate loans that can be repriced at the clients' discretion without penalty.

Allowance for credit losses

(Millions of Canadian dollars)	IFRS 9 For the year ended October 31, 2018 Balance at beginning of period	Provision for credit losses	Net write-offs (1)	Exchange rate and other (2)	Balance at end of period
Retail					
Residential mortgages	$ 378	$ 47	$ (43)	$ –	$ 382
Personal	826	513	(431)	(13)	895
Credit cards	693	534	(468)	1	760
Small business	49	33	(28)	(3)	51
Wholesale					
Business, sovereign and bank	1,010	156	(142)	(45)	979
Customers' liability under acceptances	20	–	–	1	21
	$ 2,976	$ 1,283	$ (1,112)	$ (59)	$ 3,088
Presented as:					
Allowance for loan losses	$ 2,749				$ 2,912
Other liabilities – Provisions	207				154
Customers' liability under acceptances	20				21
Other components of equity	–				1

(1) Loans written-off are generally subject to continued collection efforts for a period of time following write-off. The contractual amount outstanding on loans written-off during the year ended October 31, 2018 that are no longer subject to enforcement activity was $83 million.
(2) Includes interest income on impaired loans of $77 million for the year ended October 31, 2018.

The following tables reconcile the opening and closing allowance for credit losses by stage, for each major product category.

Reconciling items include the following:
- Model changes, which generally comprise the impact of significant changes to the quantitative models used to estimate expected credit losses, and any staging impacts that may arise.
- Transfers between stages, which are presumed to occur before any corresponding remeasurements of the allowance.
- Purchases and originations, which reflect the allowance related to assets newly recognized during the period, including those assets that were derecognized following a modification of terms.
- Derecognitions and maturities, which reflect the allowance related to assets derecognized during the period without a credit loss being incurred, including those assets that were derecognized following a modification of terms.
- Remeasurements which comprise the impact of changes in model inputs or assumptions, including changes in forward-looking macroeconomic conditions; partial repayments and additional draws on existing facilities; changes in the measurement following a transfer between stages; and unwinding of the time value discount due to the passage of time in Stage 1 and Stage 2.

Allowance for credit losses – Residential mortgages

	IFRS 9 For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 140	$ 65	$ 173	$ 378
Provision for credit losses				
Model changes	20	2	4	26
Transfers in (out) to Stage 1	59	(59)	–	–
Transfers in (out) to Stage 2	(18)	23	(5)	–
Transfers in (out) to Stage 3	(2)	(16)	18	–
Purchases and originations	63	1	–	64
Derecognitions and maturities	(13)	(10)	–	(23)
Remeasurements	(110)	56	34	(20)
Write-offs	–	–	(51)	(51)
Recoveries	–	–	8	8
Exchange rate and other	3	2	(5)	–
Balance at end of period	$ 142	$ 64	$ 176	$ 382

Allowance for credit losses – Personal

	IFRS 9			
	For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 278	$ 427	$ 121	$ 826
Provision for credit losses				
Model changes	(10)	1	(6)	(15)
Transfers in (out) to Stage 1	712	(712)	–	–
Transfers in (out) to Stage 2	(140)	141	(1)	–
Transfers in (out) to Stage 3	(3)	(157)	160	–
Purchases and originations	107	5	–	112
Derecognitions and maturities	(33)	(130)	–	(163)
Remeasurements	(668)	938	309	579
Write-offs	–	–	(552)	(552)
Recoveries	–	–	121	121
Exchange rate and other	(1)	(1)	(11)	(13)
Balance at end of period	$ 242	$ 512	$ 141	$ 895

Allowance for credit losses – Credit cards

	IFRS 9			
	For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 251	$ 442	$ –	$ 693
Provision for credit losses				
Model changes	(65)	64	–	(1)
Transfers in (out) to Stage 1	693	(693)	–	–
Transfers in (out) to Stage 2	(123)	123	–	–
Transfers in (out) to Stage 3	(2)	(227)	229	–
Purchases and originations	11	2	–	13
Derecognitions and maturities	(12)	(60)	–	(72)
Remeasurements	(592)	947	239	594
Write-offs	–	–	(599)	(599)
Recoveries	–	–	131	131
Exchange rate and other	–	1	–	1
Balance at end of period	$ 161	$ 599	$ –	$ 760

Allowance for credit losses – Small business

	IFRS 9			
	For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 15	$ 15	$ 19	$ 49
Provision for credit losses				
Model changes	–	–	–	–
Transfers in (out) to Stage 1	31	(31)	–	–
Transfers in (out) to Stage 2	(5)	5	–	–
Transfers in (out) to Stage 3	–	(11)	11	–
Purchases and originations	10	–	–	10
Derecognitions and maturities	(4)	(9)	–	(13)
Remeasurements	(31)	48	19	36
Write-offs	–	–	(35)	(35)
Recoveries	–	–	7	7
Exchange rate and other	1	(1)	(3)	(3)
Balance at end of period	$ 17	$ 16	$ 18	$ 51

Allowance for credit losses – Business, sovereign and bank

	IFRS 9			
	For the year ended October 31, 2018			
	Performing		Impaired	
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	$ 251	$ 352	$ 407	$ 1,010
Provision for credit losses				
Model changes	(17)	(12)	(6)	(35)
Transfers in (out) to Stage 1	207	(207)	–	–
Transfers in (out) to Stage 2	(66)	93	(27)	–
Transfers in (out) to Stage 3	(2)	(43)	45	–
Purchases and originations	227	46	–	273
Derecognitions and maturities	(153)	(179)	–	(332)
Remeasurements	(176)	289	137	250
Write-offs	–	–	(207)	(207)
Recoveries	–	–	65	65
Exchange rate and other	3	1	(49)	(45)
Balance at end of period	$ 274	$ 340	$ 365	$ 979

Allowance for credit losses

	IAS 39						
	For the year ended October 31, 2017						
(Millions of Canadian dollars)	Balance at beginning of period	Provision for credit losses	Write-offs	Recoveries	Unwind of discount	Exchange rate changes/ other	Balance at end of period
Retail							
Residential mortgages	$ 273	$ 90	$ (53)	$ 8	$ (21)	$ –	$ 297
Personal	529	422	(543)	116	(11)	(1)	512
Credit cards	386	427	(565)	131	–	–	379
Small business	65	29	(38)	9	(3)	(6)	56
	1,253	968	(1,199)	264	(35)	(7)	1,244
Wholesale							
Business	979	180	(226)	66	(69)	(18)	912
Bank	–	–	–	–	–	–	–
	979	180	(226)	66	(69)	(18)	912
Acquired credit-impaired loans	3	2	–	–	–	(2)	3
Total allowance for loan losses	2,235	1,150	(1,425)	330	(104)	(27)	2,159
Allowance for off-balance sheet and other items (1)	91	–	–	–	–	–	91
Total allowance for credit losses	$ 2,326	$ 1,150	$ (1,425)	$ 330	$ (104)	$ (27)	$ 2,250
Individually assessed	$ 365	$ 86	$ (139)	$ 47	$ (52)	$ (3)	$ 304
Collectively assessed	1,961	1,064	(1,286)	283	(52)	(24)	1,946
Total allowance for credit losses	$ 2,326	$ 1,150	$ (1,425)	$ 330	$ (104)	$ (27)	$ 2,250

(1) The allowance for off-balance sheet and other items is reported separately in Other liabilities – Provisions.

Key inputs and assumptions

The measurement of expected credit losses is a complex calculation that involves a large number of interrelated inputs and assumptions. The key drivers of changes in expected credit losses include the following:

- Changes in the credit quality of the borrower or instrument, primarily reflected in changes in internal risk ratings;
- Changes in forward-looking macroeconomic conditions, specifically the macroeconomic variables to which our models are calibrated, which are those most closely correlated with credit losses in the relevant portfolio;
- Changes in scenario design and the weights assigned to each scenario; and
- Transfers between stages, which can be trigged by changes to any of the above inputs.

Internal risk ratings

Internal risk ratings are assigned according to the risk management framework outlined under the headings "Wholesale credit risk" and "Retail credit risk" of the Credit risk section of Management's Discussion and Analysis. Changes in internal risk ratings are primarily reflected in the PD parameters, which are estimated based on our historical loss experience at the relevant risk segment or risk rating level, adjusted for forward-looking information.

Forward looking macroeconomic variables

The PD, LGD and EAD inputs used to estimate Stage 1 and Stage 2 credit loss allowances are modelled based on the macroeconomic variables (or changes in macroeconomic variables) that are most closely correlated with credit losses in the relevant portfolio. Each macroeconomic scenario used in our expected credit loss calculation includes a projection of all relevant macroeconomic variables used in our models for a five year period, reverting to long-run averages generally within the 2 to 5 year period. Depending on their usage in the models, macroeconomic variables are projected at a country, province/state or more granular level. These include one or more of the variables described below, which differ by portfolio and region.

The following table shows the primary macroeconomic variables used in the models to estimate ACL on performing loans, commitments, and acceptances. The downside scenario reflects a negative macro-economic event occurring within the first 12 months, with conditions deteriorating for up to two years, followed by a recovery for the remainder of the period. This scenario is grounded in historical experience and assumes a monetary policy response that returns the economy to a long-run, sustainable growth rate within the forecast period. In addition to the scenarios described below, we also apply other downside scenarios that allow us to consider a broader range of possible outcomes for our credit portfolios.

	IFRS 9					
	As at October 31, 2018					
	Base Scenario		Upside Scenario		Downside Scenario	
Driver	Next 12 months	2 to 5 years	Next 12 months	2 to 5 years	Next 12 months	2 to 5 years
Unemployment rate: (1)						
Canada	5.8%	6.0%	5.7%	5.1%	6.8%	7.1%
U.S.	3.6%	4.1%	3.6%	3.3%	4.8%	5.3%
Gross domestic product: (2)						
Canada	1.7%	1.7%	2.3%	2.1%	(2.0)%	2.7%
U.S.	2.1%	1.4%	2.1%	1.9%	(2.3)%	2.6%
Oil price (West Texas Intermediate) growth rate (3)	5.6%	(2.1)%	36.0%	(7.9)%	(36.0)%	11.8%
Canadian housing price index growth rate (3)	0.1%	3.9%	5.3%	2.5%	(9.2)%	5.8%

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

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

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

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

Scenario design and weightings

Our estimation of expected credit losses in Stage 1 and Stage 2 considers five distinct future macroeconomic scenarios. Scenarios are designed to capture a wide range of possible outcomes and are weighted according to our expectation of the relative likelihood of the range of outcomes that each scenario represents at the reporting date. We then weight each scenario to take into account historical frequency, current trends, and forward-looking conditions which will change over time. The base case scenario is based on forecasts of the expected rate, value or yield for each of the macroeconomic variables identified above. The upside and downside scenarios are set by adjusting our base projections to construct reasonably possible scenarios that are more optimistic and pessimistic, respectively. Two additional downside scenarios were designed for the real estate and energy sectors to capture the broader range of potential credit losses across the bank's portfolios.

The impact of each of our five scenarios varies across our portfolios given the portfolios have different sensitivities to movements in each macroeconomic variable.

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

Transfers between stages

Transfers between Stage 1 and Stage 2 are based on the assessment of significant increases in credit risk relative to initial recognition, as described in Note 2. The impact of moving from 12 months expected credit losses to lifetime expected credit losses, or vice versa, varies by product and is dependent on the expected remaining life at the date of the transfer. Stage transfers may result in significant fluctuations in expected credit losses.

The following table illustrates the impact of staging on our ACL by comparing our allowance if all performing loans were in Stage 1 to the actual ACL recorded on these assets.

	IFRS 9		
	As at October 31, 2018		
	ACL – All performing loans in Stage 1	Impact of staging	Stage 1 and 2 ACL
Performing loans (1)	$ 1,526	$ 841	$ 2,367

(1) Represents loans and commitments in Stage 1 and Stage 2.

Credit risk exposure by internal risk rating

The following tables present the gross carrying amount of loans measured at amortized cost, and the full contractual amount of undrawn loan commitments subject to the impairment requirements of IFRS 9. Risk ratings are based on internal ratings as at the reporting date as outlined in the internal ratings maps for Wholesale and Retail facilities in the Credit risk section of Management's Discussion and Analysis.

	IFRS 9			
	As at October 31, 2018			
(Millions of Canadian dollars)	Stage 1	Stage 2	Stage 3 (1)	Total
Retail				
Loans outstanding – Residential mortgages				
Low risk	$ 222,026	$ 3,688	$ –	$ 225,714
Medium risk	13,681	1,369	–	15,050
High risk	2,577	2,897	–	5,474
Not rated	34,670	578	–	35,248
Impaired	–	–	726	726
	272,954	8,532	726	282,212
Items not subject to impairment (2)				259
Total				282,471
Loans outstanding – Personal				
Low risk	$ 71,763	$ 1,256	$ –	$ 73,019
Medium risk	6,124	1,925	–	8,049
High risk	998	1,672	–	2,670
Not rated	8,595	64	–	8,659
Impaired	–	–	303	303
	87,480	4,917	303	92,700
Total				92,700
Loans outstanding – Credit cards				
Low risk	$ 13,185	$ 100	$ –	$ 13,285
Medium risk	2,234	1,632	–	3,866
High risk	139	1,331	–	1,470
Not rated	764	30	–	794
	16,322	3,093	–	19,415
Total				19,415
Loans outstanding – Small business				
Low risk	$ 2,004	$ 46	$ –	$ 2,050
Medium risk	2,230	102	–	2,332
High risk	95	178	–	273
Not rated	166	1	–	167
Impaired	–	–	44	44
	4,495	327	44	4,866
Total				4,866
Undrawn loan commitments – Retail				
Low risk	$ 182,426	$ 1,270	$ –	$ 183,696
Medium risk	10,794	239	–	11,033
High risk	3,740	166	–	3,906
Not rated	2,584	35	–	2,619
Total	199,544	1,710	–	201,254
Wholesale				
Loans outstanding – Business, sovereign and bank				
Investment grade	$ 46,869	$ 324	$ –	$ 47,193
Non-investment grade	106,027	10,190	–	116,217
Not rated	6,692	411	–	7,103
Impaired	–	–	1,096	1,096
	159,588	10,925	1,096	171,609
Items not subject to impairment (2)				8,669
Total	159,588	10,925	1,096	180,278
Undrawn loan commitments – Wholesale				
Investment grade	$ 222,970	$ 93	$ –	$ 223,063
Non-investment grade	88,828	7,069	–	95,897
Not rated	4,291	–	–	4,291
Total	316,089	7,162	–	323,251

(1) As at October 31, 2018, 88% of credit-impaired loans were either fully or partially collateralized. For details on the types of collateral held against credit-impaired assets and our policies on collateral, refer to the Credit risk mitigation section of Management's Discussion and Analysis.

(2) Retail Loans outstanding – Residential mortgages and Wholesale loans outstanding – Business, sovereign and bank items not subject to impairment are loans held at FVTPL.

Loans and acceptances and undrawn commitments (1)

	IAS 39					
	As at October 31, 2017					
(Millions of Canadian dollars)	Low risk	Medium risk	High risk	Impaired	Standardized and Non-Rated (2)	Total
Retail (3)						
Residential mortgages	$ 221,911	$ 12,388	$ 2,383	$ 284	$ 34,200	$ 271,166
Personal	161,484	12,238	2,736	193	3,763	180,414
Credit cards	31,883	5,320	1,396	–	1,262	39,861
Small business	7,770	1,908	433	31	1,239	11,381
	$ 423,048	$ 31,854	$ 6,948	$ 508	$ 40,464	$ 502,822

	IAS 39			
	As at October 31, 2017			
(Millions of Canadian dollars)	Investment grade	Non-investment grade	Impaired	Total
Wholesale (4)				
Business	$ 108,733	$ 164,256	$ 1,372	$ 274,361
Sovereign	21,457	1,311	–	22,768
Bank	3,519	2,165	–	5,684
Total	$ 133,709	$ 167,732	$ 1,372	$ 302,813

(1) This table represents our retail and wholesale loans and acceptances outstanding and undrawn commitments by portfolio and risk category. The amounts in the tables are before allowance for loans.
(2) Under the standardized approach, credit risk exposure is based on risk weights prescribed by OSFI.
(3) Includes undrawn commitments of $1.0 billion, $88.1 billion, $21.8 billion, and $6.9 billion for Residential mortgages, Personal, Credit cards and Small business, respectively.
(4) Includes undrawn commitments of $113.9 billion, $11.4 billion, and $1.4 billion for Business, Sovereign and Bank, respectively.

Loans past due but not impaired (1)

	IFRS 9				IAS 39			
	As at							
	October 31, 2018				October 31, 2017			
(Millions of Canadian dollars)	1 to 29 days	30 to 89 days	90 days and greater	Total	1 to 29 days	30 to 89 days	90 days and greater	Total
Retail	$ 2,995	$ 1,402	$ 179	$ 4,576	$ 3,097	$ 1,337	$ 307	$ 4,741
Wholesale	1,246	468	–	1,714	1,251	424	–	1,675
	$ 4,241	$ 1,870	$ 179	$ 6,290	$ 4,348	$ 1,761	$ 307	$ 6,416

(1) Amounts presented may include loans past due as a result of administrative processes, such as mortgage loans on which payments are restrained pending payout due to sale or refinancing. Past due loans arising from administrative processes are not representative of the borrowers' ability to meet their payment obligations.

Gross carrying value of loans individually determined to be impaired (1)

	IAS 39
	As at
(Millions of Canadian dollars)	October 31 2017
Wholesale (2)	
Business	$ 1,126
Acquired credit-impaired loans	256
Total	$ 1,382

(1) Average balance of gross individually assessed impaired loans for the year ended October 31, 2017 – $2,065 million.
(2) Excludes acquired credit-impaired (ACI) loans.

Acquired credit-impaired loans
As at October 31, 2018, the carrying value of ACI loans resulting from the acquisition of City National, comprised of Retail, Wholesale and Federal Deposit Insurance Corporation (FDIC) covered loans, and the related allowance were $217 million and $4 million (October 31, 2017 – $256 million and $3 million respectively).

Note 6 Derecognition of financial assets

We enter into transactions in which we transfer financial assets such as loans or securities to structured entities or other third parties. The majority of assets transferred under repurchase agreements, securities lending agreements, and in our Canadian residential mortgage securitization transactions do not qualify for derecognition as we continue to be exposed to substantially all of the risks and rewards of the transferred assets, such as prepayment, credit, price, interest rate and foreign exchange risks.

Transferred financial assets not derecognized

Securitization of Canadian residential mortgage loans

We periodically securitize insured Canadian residential mortgage loans through the creation of MBS pools under the National Housing Act MBS (NHA MBS) program. All loans securitized under the NHA MBS program are required to be insured by the Canadian Mortgage and Housing Corporation (CMHC) or a third-party insurer. We require the borrower to pay for mortgage insurance when the loan amount is greater than 80% of the original appraised value of the property (loan-to-value (LTV) ratio). For residential mortgage loans securitized under this program with LTV ratios less than 80%, we are required to insure the mortgages at our own expense. Under the NHA MBS program, we are responsible for making all payments due on our issued MBS, regardless of whether we collect the necessary funds from the mortgagor or the insurer. When a borrower defaults on a mortgage, we submit a claim to the insurer if the amount recovered from the collection or foreclosure process is lower than the sum of the principal balance, accrued interest and collection costs on the outstanding loan. The insurance claim process is managed by the insurance provider in accordance with the insurer's policies and covers the entire unpaid loan balance plus generally up to 12 months of interest, selling costs and other eligible expenses. If an insurance claim is denied, a loss is recognized in Provision for credit losses in our Consolidated Statements of Income. The amount recorded as a loss is not significant to our Consolidated Financial Statements and no significant losses were incurred due to legal action arising from mortgage default during 2018 and 2017.

We sell the NHA MBS pools primarily to a government-sponsored structured entity under the Canada Mortgage Bond (CMB) program. The entity periodically issues CMBs, which are guaranteed by the government, and sells them to third-party investors. Proceeds of the CMB issuances are used by the entity to purchase the NHA MBS pools from eligible NHA MBS issuers who participate in the issuance of a particular CMB series. Our continuing involvement includes servicing the underlying residential mortgage loans we have securitized, either ourselves or through a third-party servicer. We also act as counterparty in interest rate swap agreements where we pay the entity the interest due to CMB investors and receive the interest on the underlying MBS and reinvested assets. As part of the swaps, we are also required to maintain a principal reinvestment account for principal payments received on the underlying mortgage loans to meet the repayment obligation upon maturity of the CMB. We reinvest the collected principal payments in permitted investments as outlined in the swap agreements.

We have determined that certain of the NHA MBS program loans transferred to the entity do not qualify for derecognition as we have not transferred substantially all of the risks and rewards of ownership. As a result, these transferred MBS continue to be classified as residential mortgage loans and recognized on our Consolidated Balance Sheets. The cash received for these transferred MBS is treated as a secured borrowing and a corresponding liability is recorded in Deposits – Business and government on our Consolidated Balance Sheets.

Securities sold under repurchase agreements and securities loaned

We also enter into transactions such as repurchase agreements and securities lending agreements where we transfer assets under agreements to repurchase them at a future date and retain substantially all of the risks and rewards associated with the assets. These transferred assets remain on our Consolidated Balance Sheets and are accounted for as collateralized borrowing transactions.

The following table provides information on the carrying amount and fair value of the transferred assets that did not qualify for derecognition, and their associated liabilities.

	As at							
	October 31, 2018				October 31, 2017			
(Millions of Canadian dollars)	**Canadian residential mortgage loans (1) (2)**	**Securities sold under repurchase agreements (3)**	**Securities loaned (3)**	**Total**	Canadian residential mortgage loans (1) (2)	Securities sold under repurchase agreements (3)	Securities loaned (3)	Total
Carrying amount of transferred assets that do not qualify for derecognition	**$ 34,105**	**$ 202,543**	**$ 4,271**	**$ 240,919**	$ 33,948	$ 139,249	$ 3,835	$ 177,032
Carrying amount of associated liabilities	**33,975**	**202,543**	**4,271**	**240,789**	33,861	139,249	3,835	176,945
Fair value of transferred assets	**$ 33,490**	**$ 202,544**	**$ 4,271**	**$ 240,305**	$ 33,529	$ 139,249	$ 3,835	$ 176,613
Fair value of associated liabilities	**33,916**	**202,544**	**4,271**	**240,731**	34,314	139,249	3,835	177,398
Fair value of net position	**$ (426)**	**$ –**	**$ –**	**$ (426)**	$ (785)	$ –	$ –	$ (785)

(1) Includes Canadian residential mortgage loans transferred primarily to Canada Housing Trust at the initial securitization and other permitted investments used for funding requirements after the initial securitization.

(2) CMB investors have legal recourse only to the transferred assets, and do not have recourse to our general assets.

(3) Does not include over-collateralization of assets pledged.

Transferred financial assets derecognized

Generally, the securitization of Canadian residential mortgage loans into the NHA MBS program do not qualify for derecognition as we have not transferred substantially all of the risks and rewards of ownership. During the year ended October 31, 2018, we recognized net gains of $16 million in Non-interest income arising from the derecognition of residential mortgage loans measured at amortized cost. The assets were derecognized as both the NHA MBS and the residual interests in the underlying residential mortgage loans were sold to third parties resulting in the transfer of substantially all of the risks and rewards.

Note 7 Structured entities

In the normal course of business, we engage in a variety of financial transactions with structured entities to support our financing and investing needs as well as those of our customers. A structured entity is an entity in which voting or similar rights are not the dominant factor in deciding control. Structured entities are generally created to achieve a narrow and well defined objective with restrictions around their ongoing activities. We consolidate a structured entity when we control the entity in accordance with our accounting policy as described in Note 2. In other cases, we may sponsor or have an interest in such an entity but may not consolidate it.

Consolidated structured entities

We consolidate the following structured entities, whose assets and liabilities are recorded on our Consolidated Balance Sheets. Third-party investors in these structured entities generally have recourse only to the assets of the related entity and do not have recourse to our general assets unless we breach our contractual obligations to those entities. In the ordinary course of business, the assets of each consolidated structured entity can generally only be used to settle the obligations of that entity.

RBC-administered multi-seller conduits

We generally do not maintain ownership in the multi-seller conduits and generally do not have rights to, or control of, their assets. However, we issue ABCP through a multi-seller conduit that does not have a first loss investor with substantive power to direct the significant operating activities of the conduit. This conduit is consolidated because we have exposure to variability of returns from performance in the multi-seller arrangements through providing transaction-specific and program-wide liquidity, credit and loan facilities to the conduit and have decision-making power over the relevant activities. As of October 31, 2018, $2.4 billion of financial assets held by the conduit was included in Loans (October 31, 2017 – $0.6 billion) and $1.3 billion of ABCP issued by the conduit was included in Deposits (October 31, 2017 – $0.5 billion) on our Consolidated Balance Sheets.

Credit card securitization vehicle

We securitize a portion of our credit card receivables through a structured entity on a revolving basis. The entity purchases co-ownership interests in a pool of credit card receivables and issues senior and subordinated term notes collateralized by that co-ownership interest in the underlying pool of credit card receivables. Investors who purchase the term notes have recourse only to that co-ownership interest in the underlying pool of credit card receivables.

We continue to service the credit card receivables and perform an administrative role for the entity. We also retain risk in the underlying pool of credit card receivables through our retained interest in the transferred assets, the cash reserve balance we fund from time to time, and also through certain subordinated notes which we retain. Additionally, we may own some senior notes as investments or for market-making activities, we have provided subordinated loans to the entity to pay upfront expenses, and we act as counterparty to interest rate and cross currency swap agreements which hedge the entity's interest rate and currency risk exposure.

We consolidate the structured entity because we have decision-making power over the timing and size of future issuances and other relevant activities which were predetermined by us at inception. We also obtain significant funding benefits and are exposed to variability from the performance of the underlying credit card receivables through our retained interest. As at October 31, 2018, $8.5 billion of notes issued by our credit card securitization vehicle were included in Deposits on our Consolidated Balance Sheets (October 31, 2017 – $7.5 billion).

Collateralized commercial paper vehicle

We established a funding vehicle that provides loans to us and finances those loans by issuing commercial paper to third-party investors. The structured entity's commercial paper carries an equivalent credit rating to Royal Bank of Canada because we are obligated to advance funds to the entity in the event there are insufficient funds from other sources to settle maturing commercial paper. We pledge collateral to secure the loans and are exposed to the market and credit risks of the pledged securities.

We consolidate the structured entity because we have decision-making power over the relevant activities, are the sole borrower from the structure, and are exposed to a majority of the residual ownership risks through the credit support provided. As at October 31, 2018, $16.6 billion of commercial paper issued by the vehicle was included in Deposits on our Consolidated Balance Sheets (October 31, 2017 – $12.2 billion).

Covered bonds

We periodically transfer mortgages to RBC Covered Bond Guarantor Limited Partnership (the Guarantor LP) to support funding activities and asset coverage requirements under our covered bonds program. The Guarantor LP was created to guarantee interest and principal payments under the covered bond program. The covered bonds guaranteed by the Guarantor LP are direct, unsecured and unconditional obligations of Royal Bank of Canada; therefore, investors have a claim against the Bank which will continue if the covered bonds are not paid by the Bank and the mortgage assets in the Guarantor LP are insufficient to satisfy the obligations owing on the covered bonds. We act as general partner, limited partner, swap counterparty, lender and liquidity provider to the Guarantor LP, servicer for the underlying mortgages as well as the registered issuer of the covered bonds.

We consolidate the Guarantor LP as we have the decision-making power over the relevant activities through our role as general partner and are exposed to variability from the performance of the underlying mortgages. As at October 31, 2018, the total amount of mortgages transferred and outstanding was $53.0 billion (October 31, 2017 – $52.5 billion) and $36.9 billion of covered bonds were recorded as Deposits on our Consolidated Balance Sheets (October 31, 2017 – $37.3 billion).

Municipal bond TOB structures

We sell taxable and tax-exempt municipal bonds into Tender Option Bond (TOB) structures, which consist of a credit enhancement (CE) trust and a TOB trust. The CE trust purchases a bond from us, financed with a trust certificate issued to the TOB trust. The TOB trust then issues floating-rate certificates to short-term investors and a residual certificate that is held by us. We are the remarketing agent for the floating-rate certificates and provide a liquidity facility to the TOB trust which requires us to purchase any certificates tendered but not successfully remarketed. We also provide a letter of credit to the CE trust under which we are required to extend funding if there are any losses on the underlying bonds. We earn interest on the residual certificate and receive market-based fees for acting as remarketing agent and providing the liquidity facility and letter of credit.

We consolidate both the CE trust and TOB trust when we are the holder of the residual certificate as we have decision-making power over the relevant activities, including the selection of the underlying municipal bonds and the ability to terminate the structure, and are exposed to variability from the performance of the underlying municipal bonds. As at October 31, 2018, $7.1 billion of municipal bonds were included in Investment securities related to consolidated TOB structures (October 31, 2017 – $5.2 billion) and a corresponding $7.6 billion of floating-rate certificates were included in Deposits on our Consolidated Balance Sheets (October 31, 2017 – $5.2 billion).

RBC managed investment funds

We are sponsors and investment managers of mutual and pooled funds, which give us the ability to direct the investment decisions of the funds. We consolidate those mutual and pooled funds in which our interests, which include direct investment in seed capital plus management or performance fees, indicate that we are acting as a principal. As at October 31, 2018, $548 million of Trading securities held in the consolidated funds (October 31, 2017 – $473 million) and $128 million of Other liabilities representing the fund units held by third parties (October 31, 2017 – $148 million) were recorded on our Consolidated Balance Sheets.

Unconsolidated structured entities

We have interests in certain structured entities that we do not consolidate but have recorded assets and liabilities on our Consolidated Balance Sheets related to our transactions and involvement with these entities.

The following table presents the assets and liabilities recorded on our Consolidated Balance Sheets and our maximum exposure to loss related to our interests in unconsolidated structured entities. It also presents the size of each class of unconsolidated structured entity, as measured by the total assets of the entities in which we have an interest.

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

	As at October 31, 2017					
(Millions of Canadian dollars)	Multi-seller conduits (1)	Structured finance	Non-RBC managed investment funds	Third-party securitization vehicles	Other	Total
On-balance sheet assets						
Securities	$ 1,028	$ –	$ 2,903	$ –	$ 869	$ 4,800
Loans	371	1,078	–	3,246	750	5,445
Derivatives	17	–	–	–	32	49
Other assets	–	443	–	–	254	697
	$ 1,416	$ 1,521	$ 2,903	$ 3,246	$ 1,905	$ 10,991
On-balance sheet liabilities						
Derivatives	$ 41	$ –	$ –	$ –	$ –	$ 41
Other liabilities	–	–	–	–	–	–
	$ 41	$ –	$ –	$ –	$ –	$ 41
Maximum exposure to loss (2)	$ 38,639	$ 4,280	$ 3,153	$ 6,767	$ 2,429	$ 55,268
Total assets of unconsolidated structured entities	$ 37,871	$ 16,778	$ 533,219	$ 62,411	$ 409,562	$ 1,059,841

(1) Total assets of unconsolidated structured entities represent the maximum assets that may have to be purchased by the conduits under purchase commitments outstanding. Of the purchase commitments outstanding, the conduits have purchased financial assets totalling $24.7 billion as at October 31, 2018 (October 31, 2017 – $25.2 billion).

(2) The maximum exposure to loss resulting from our interests in these entities consists mostly of investments, loans, fair value of derivatives, liquidity and credit enhancement facilities. The maximum exposure to loss of the multi-seller conduits is higher than the on-balance sheet assets primarily because of the notional amounts of the backstop liquidity and credit enhancement facilities. Refer to Note 24.

Below is a description of our involvement with each significant class of unconsolidated structured entity.

Multi-seller conduits
We administer multi-seller ABCP conduit programs. Multi-seller conduits primarily purchase financial assets from clients and finance those purchases by issuing ABCP.

In certain multi-seller conduit arrangements, we do not maintain any ownership of the multi-seller conduits that we administer and have no rights to, or control of, its assets. As the administrative agent, we earn a residual fee for providing services such as coordinating funding activities, transaction structuring, documentation, execution and monitoring. The ABCP issued by each multi-seller conduit is in the conduit's own name with recourse to the financial assets owned by the multi-seller conduit, and is non-recourse to us except through our participation in liquidity and/or credit enhancement facilities.

We provide transaction-specific and program-wide liquidity facilities to the multi-seller conduits. In addition, we provide program-wide credit enhancement to the multi-seller conduits which obligate us to purchase assets or advance funds in the event the multi-seller conduit does not otherwise have funds from other sources, such as from the liquidity facilities, to settle maturing ABCP. In some cases, we or another third party may provide transaction-specific credit enhancement which can take various forms. We receive market-based fees for providing these liquidity and credit facilities.

For certain transactions, we act as counterparty to foreign exchange forward contracts and interest rate swaps to facilitate our clients' securitization of fixed rate and/or foreign currency denominated assets through the conduits. These derivatives expose us to foreign exchange and interest rate risks that are centrally managed by our foreign exchange trading and swap desks, respectively, and credit risk on the underlying assets that is mitigated by the credit enhancement described below.

Each transaction is structured with transaction-specific first loss protection provided by the third-party seller. This enhancement can take various forms, including but not limited to overcollateralization, excess spread, subordinated classes of financial assets, guarantees or letters of credit. The amount of this enhancement varies but is generally sized to cover a multiple of loss experience.

An unrelated third party (expected loss investor) absorbs losses, up to a maximum contractual amount, that may occur in the future on the assets in the multi-seller conduits before the multi-seller conduits' debt holders and us. In return for assuming this multi-seller conduit first-loss position, each multi-seller conduit pays the expected loss investor a return commensurate with its risk position. The expected loss investor has substantive power to direct the majority of the activities which significantly impact the conduit's economic performance, including initial selection and approval of the asset purchase commitments and liquidity facilities, approval of renewal and amendment of these transactions and facilities, sale or transfer of assets, ongoing monitoring of asset performance, mitigation of losses, and management of the ABCP liabilities.

We do not consolidate these multi-seller conduits as we do not control the conduit as noted above.

Structured finance
We purchased U.S. ARS from certain trusts (U.S. ARS Trusts) which fund their long-term investments in student loans by issuing short-term senior and subordinated notes. We are subject to losses on these U.S. ARS Trusts if defaults are experienced on the underlying student loans; however, the principal and accrued interest on the student loans are guaranteed by U.S. government agencies. We act as auction agent for some of these entities but have no legal obligation to purchase the notes issued by these entities in the auction process. We do not consolidate these U.S. ARS Trusts as we do not have decision-making power over the investing and financing activities of the Trusts, which are the activities that most significantly affect the performance of the Trusts.

Additionally, we invest in certain municipal bond TOB structures that we do not consolidate. These structures are similar to those consolidated municipal bond TOB structures described above; however, the residual certificates are held by third-parties. We provide liquidity facilities on the floating-rate certificates which may be drawn if certificates are tendered but not able to be remarketed. We do not have decision-making power over the relevant activities of the structures; therefore, we do not consolidate these structures. The assets transferred into these programs are derecognized from our Consolidated Balance Sheets.

We provide senior warehouse financing to structured entities that are established by third parties to acquire loans for the purposes of issuing a term collateralized loan obligation (CLO) transaction. Subordinated financing is provided during the warehouse phase by one or more third-party equity investors. We act as the arranger and placement agent for the term CLO transaction. Proceeds from the sale of the term CLO are used to repay our senior warehouse financing, at which point we have no further involvement with the transaction. We do not consolidate these CLO structures as we do not have decision-making power over the relevant activities of the entity, which include the initial selection and subsequent management of the underlying debt portfolio.

Non-RBC managed investment funds
We enter into fee-based equity derivative transactions with third parties including mutual funds, unit investment trusts and other investment funds. These transactions provide their investors with the desired exposure to a reference fund, and we economically hedge our exposure to these derivatives by investing in those reference funds. We also act as custodian or administrator for several funds. We do not consolidate those reference funds that are managed by third parties as we do not have power to direct their investing activities.

We provide liquidity facilities to certain third-party investment funds. The funds issue unsecured variable-rate preferred shares and invest in portfolios of tax-exempt municipal bonds. Undrawn liquidity commitments expose us to the liquidity risk of the preferred shares and drawn commitments expose us to the credit risk of the underlying municipal bonds. We do not consolidate these third-party managed funds as we do not have power to direct their investing activities.

Third-party securitization vehicles
We hold interests in securitization vehicles that provide funding to certain third parties on whose behalf the entities were created. The activities of these entities are limited to the purchase and sale of specified assets from the sponsor and the issuance of asset-backed notes collateralized by those assets. The underlying assets are typically receivables, including auto loans and leases. We, as well as other financial institutions, are obligated to provide funding up to our maximum commitment level and are exposed to credit losses on the underlying assets after various credit enhancements. Enhancements can take various forms, including but not limited to overcollateralization, excess spread, subordinated classes of financial assets, guarantees or letters of credit. The amount of this enhancement varies but is generally sized to cover a multiple of loss experience. We do not consolidate these entities as we do not have decision-making power over the relevant activities, including the entities' investing and financing activities.

Other
Other unconsolidated structured entities include managed investment funds, credit investment products and tax credit funds.

We are sponsors and investment managers of mutual and pooled funds, which gives us the ability to direct the investment decisions of the funds. We do not consolidate those mutual and pooled funds if we exercise our decision-making power as an agent on behalf of other unit holders.

We use structured entities to generally transform credit derivatives into cash instruments, to distribute credit risk and to create customized credit products to meet investors' specific requirements. We enter into derivative contracts, including credit derivatives, to purchase protection from these entities (credit protection) and convert various risk factors such as yield, currency or credit risk of underlying assets to meet the needs of the investors. We act as sole arranger and swap provider for certain entities and, in some cases, fulfill other administrative functions for the entities. We do not consolidate these credit investment product entities as we do not have decision-making power over the relevant activities, which include selection of the collateral and reference portfolio, and are not exposed to a majority of the benefits or risks of the entities.

We created certain funds to pass through tax credits received from underlying low-income housing, historic rehabilitation real estate projects to third parties, or new market tax credits (tax credit funds). We are sponsors of the tax credit funds as a result of our responsibility to manage the funds, arrange the financing, and perform the administrative duties of these tax credit funds. We do not consolidate the tax credit funds as the third-party investors in these funds have the decision-making power to select the underlying investments and are exposed to the majority of the residual ownership and tax risks of the funds.

We also purchase passive interests in renewable energy tax credit entities created and controlled by third parties. We do not consolidate these third party funds as we do not have decision-making power over the relevant activities and our investments are managed as part of larger portfolios which are held for trading purposes.

Other interests in unconsolidated structured entities
In the normal course of business, we buy and sell passive interests in certain third-party structured entities, including mutual funds, exchange traded funds, and government-sponsored asset backed securities vehicles. Our investments in these entities are managed as part of larger portfolios which are held for trading, liquidity or hedging purposes. We did not create or sponsor these entities and do not have any decision-making power over their ongoing activities. Our maximum exposure to loss is limited to our on-balance sheet investments in these entities, which are not included in the table above. As at October 31, 2018 and 2017, our investments in these entities were included in Trading and Investment securities on our Consolidated Balance Sheets. Refer to Note 3 and Note 4 for further details on our Trading and Investment securities.

Sponsored entities
We are a sponsor of certain structured entities in which we have interests but do not consolidate. In determining whether we are a sponsor of a structured entity, we consider both qualitative and quantitative factors, including the purpose and nature of the entity, our initial and continuing involvement and whether we hold subordinated interests in the entity. We are considered to be the sponsor of certain credit investment products, tax credit entities, RBC managed mutual funds and a commercial mortgage securitization vehicle. During the year ended October 31, 2018, we transferred commercial mortgages with a carrying amount of $352 million (October 31, 2017 – $407 million) to a sponsored securitization vehicle in which we did not have any interests as at the end of the reporting period.

Financial support provided to structured entities
During the years ended October 31, 2018 and 2017, we have not provided any financial or non-financial support to any consolidated or unconsolidated structured entities when we were not contractually obligated to do so. Furthermore, we have no intention to provide such support in the future.

Note 8 Derivative financial instruments and hedging activities

Derivative instruments are categorized as either financial or non-financial derivatives. Financial derivatives are financial contracts whose value is derived from an underlying interest rate, foreign exchange rate, credit risk, and equity or equity index. Non-financial derivatives are contracts whose value is derived from a precious metal, commodity instrument or index. The notional amount of derivatives represents the contract amount used as a reference point to calculate payments. Notional amounts are generally not exchanged by counterparties, and do not reflect our exposure at default.

Financial derivatives
Forwards and futures
Forward contracts are non-standardized agreements that are transacted between counterparties in the OTC market, whereas futures are standardized contracts with respect to amounts and settlement dates, and are traded on regular futures exchanges. Examples of forwards and futures are described below.

Interest rate forwards (forward rate agreements) and futures are contractual obligations to buy or sell an interest-rate sensitive financial instrument on a predetermined future date at a specified price.

Foreign exchange forwards and futures are contractual obligations to exchange one currency for another at a specified price for settlement at a predetermined future date.

Equity forwards and futures are contractual obligations to buy or sell at a fixed value (the specified price) of an equity index, a basket of stocks or a single stock at a predetermined future date.

Swaps
Swaps are OTC contracts in which two counterparties exchange a series of cash flows based on agreed upon rates applied to a notional amount. Examples of swap agreements are described below.

Interest rate swaps are agreements where two counterparties exchange a series of payments based on different interest rates applied to a notional amount in a single currency. Certain interest rate swaps are transacted and settled through a clearing house which acts as a central counterparty. Cross currency swaps involve the exchange of fixed payments in one currency for the receipt of fixed payments in another currency. Cross currency interest rate swaps involve the exchange of both interest and notional amounts in two different currencies.

Equity swaps are contracts in which one counterparty agrees to pay or receive from the other cash flows based on changes in the value of an equity index, a basket of stocks or a single stock.

Options
Options are contractual agreements under which the seller (writer) grants the purchaser the right, but not the obligation, either to buy (call option) or sell (put option) a security, exchange rate, interest rate, or other financial instrument or commodity at a specified price, at or by a predetermined future date. The seller (writer) of an option can also settle the contract by paying the cash settlement value of the purchaser's right. The seller (writer) receives a premium from the purchaser for this right. The various option agreements that we enter into include but are not limited to interest rate options, foreign currency options, equity options and index options.

Credit derivatives
Credit derivatives are OTC contracts that transfer credit risk related to an underlying financial instrument (referenced asset) from one counterparty to another. Credit derivatives include credit default swaps, credit default baskets and total return swaps.

Credit default swaps provide protection against the decline in the value of the referenced asset as a result of specified credit events such as default or bankruptcy. They are similar in structure to an option, whereby the purchaser pays a premium to the seller of the credit default swap in return for payment contingent on a credit event affecting the referenced asset.

Credit default baskets are similar to credit default swaps except that the underlying referenced financial instrument is a group of assets instead of a single asset.

Total return swaps are contracts where one counterparty agrees to pay or receive from the other cash amounts based on changes in the value of a referenced asset or group of assets, including any returns such as interest earned on these assets, in exchange for amounts that are based on prevailing market funding rates.

Other derivative products
Other contracts are stable value and equity derivative contracts.

Non-financial derivatives
Other contracts also include non-financial derivative products such as precious metal and commodity derivative contracts in both the OTC and exchange markets.

Derivatives issued for trading purposes
Most of our derivative transactions relate to client-driven sales and trading activities, and associated market risk hedging. Sales activities include the structuring and marketing of derivative products to clients, enabling them to modify or reduce risks. Trading involves market-making, positioning and arbitrage activities. Market-making involves quoting bid and offer prices to other market participants with the intention of generating revenue based on spread and volume. Positioning involves the active management of derivative transactions with the expectation of profiting from favourable movements in prices, rates, or indices. Arbitrage activities involve identifying and profiting from price differentials between markets and product types. Any realized and unrealized gains or losses on derivatives used for trading purposes are recognized immediately in Non-interest income – Trading revenue.

Derivatives issued for other-than-trading purposes
We also use derivatives for purposes other than trading, primarily for hedging, in conjunction with the management of interest rate, credit, equity and foreign exchange risk related to our funding, lending, investment activities and asset/liability management.

Interest rate swaps are used to manage our exposure to interest rate risk by modifying the repricing or maturity characteristics of existing and/or forecasted assets and liabilities, including funding and investment activities. Purchased options are used to hedge redeemable deposits and other options embedded in consumer products. We manage our exposure to foreign currency risk with cross currency swaps and foreign exchange forward contracts. We predominantly use credit derivatives to manage our credit exposures. We mitigate industry sector concentrations and single-name exposures related to our credit portfolio by purchasing credit derivatives to transfer credit risk to third parties.

Certain derivatives and cash instruments are specifically designated and qualify for hedge accounting. From time to time, we also enter into derivative transactions to economically hedge certain exposures that do not otherwise qualify for hedge accounting, or where hedge accounting is not considered economically feasible to implement. In such circumstances, changes in fair value are reflected in Other income in Non-interest income.

Notional amount of derivatives by term to maturity (absolute amounts)

	As at October 31, 2018					
	Term to maturity					
(Millions of Canadian dollars)	Within 1 year	1 through 5 years	Over 5 years	Total	Trading	Other than Trading
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	$ 1,895,613	$ 8,788	$ –	$ 1,904,401	$ 1,904,401	$ –
Swaps	4,535,040	4,377,512	2,856,403	11,768,955	11,424,094	344,861
Options purchased	101,663	155,985	27,273	284,921	284,921	–
Options written	87,254	156,886	37,217	281,357	281,357	–
Foreign exchange contracts						
Forward contracts	1,397,520	30,688	616	1,428,824	1,420,575	8,249
Cross currency swaps	30,358	4,379	1,170	35,907	27,545	8,362
Cross currency interest rate swaps	347,477	767,742	365,880	1,481,099	1,430,437	50,662
Options purchased	33,202	11,037	1,807	46,046	46,046	–
Options written	37,716	12,250	4,515	54,481	54,481	–
Credit derivatives (1)	1,578	5,263	3,424	10,265	9,752	513
Other contracts	81,720	66,686	17,409	165,815	161,323	4,492
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	38,825	22,465	11	61,301	61,301	–
Futures – short positions	32,424	23,072	6	55,502	55,502	–
Options purchased	2,587	3,312	–	5,899	5,899	–
Options written	2,544	1,291	–	3,835	3,835	–
Foreign exchange contracts						
Futures – long positions	277	–	–	277	277	–
Futures – short positions	340	–	–	340	340	–
Other contracts	228,549	59,308	372	288,229	288,229	–
	$ 8,854,687	$ 5,706,664	$ 3,316,103	$ 17,877,454	$ 17,460,315	$ 417,139

	As at October 31, 2017					
	Term to maturity					
(Millions of Canadian dollars)	Within 1 year	1 through 5 years	Over 5 years	Total	Trading	Other than Trading
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	$ 1,156,843	$ 31,989	$ –	$ 1,188,832	$ 1,188,832	$ –
Swaps	2,570,180	3,450,280	2,331,289	8,351,749	7,854,309	497,440
Options purchased	77,953	124,083	59,435	261,471	261,471	–
Options written	61,765	106,887	63,685	232,337	232,337	–
Foreign exchange contracts						
Forward contracts	1,326,223	33,543	623	1,360,389	1,343,196	17,193
Cross currency swaps (2)	20,436	35,662	39,440	95,538	89,254	6,284
Cross currency interest rate swaps	281,590	551,576	268,119	1,101,285	1,048,891	52,394
Options purchased	55,851	13,913	3,386	73,150	73,150	–
Options written	55,922	9,187	2,829	67,938	67,938	–
Credit derivatives (1)	1,975	7,686	3,814	13,475	13,330	145
Other contracts	56,166	49,652	19,241	125,059	120,737	4,322
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	33,195	19,688	55	52,938	52,938	–
Futures – short positions	35,726	23,478	9	59,213	59,213	–
Options purchased	8,274	695	–	8,969	8,969	–
Options written	10,872	317	–	11,189	11,189	–
Foreign exchange contracts						
Futures – long positions	83	–	–	83	83	–
Futures – short positions	291	142	–	433	433	–
Other contracts	198,360	44,858	528	243,746	243,607	139
	$ 5,951,705	$ 4,503,636	$ 2,792,453	$ 13,247,794	$ 12,669,877	$ 577,917

(1) Credit derivatives with a notional value of $0.5 billion (October 31, 2017 - $0.1 billion) are economic hedges. Trading credit derivatives comprise protection purchased of $6.2 billion (October 31, 2017 – $8.5 billion) and protection sold of $3.6 billion (October 31, 2017 – $4.8 billion).

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

Fair value of derivative instruments

(Millions of Canadian dollars)	October 31, 2018 Positive	October 31, 2018 Negative	October 31, 2017 Positive	October 31, 2017 Negative
	As at			
Held or issued for trading purposes				
Interest rate contracts				
Forward rate agreements	$ 308	$ 232	$ 324	$ 319
Swaps	29,340	25,501	101,481	96,408
Options purchased	3,211	–	3,108	–
Options written	–	3,471	–	3,696
	32,859	29,204	104,913	100,423
Foreign exchange contracts				
Forward contracts	13,367	12,929	13,643	14,562
Cross currency swaps	174	258	4,229	3,438
Cross currency interest rate swaps	26,837	25,849	21,740	19,054
Options purchased	1,540	–	1,324	–
Options written	–	1,272	–	1,217
	41,918	40,308	40,936	38,271
Credit derivatives	38	89	157	246
Other contracts	17,668	18,300	13,775	17,183
	92,483	87,901	159,781	156,123
Held or issued for other-than-trading purposes				
Interest rate contracts				
Swaps	1,226	1,142	1,612	1,177
Options purchased	–	–	–	–
Options written	–	–	–	–
	1,226	1,142	1,612	1,177
Foreign exchange contracts				
Forward contracts	31	33	246	250
Cross currency swaps	212	423	207	318
Cross currency interest rate swaps	1,145	1,104	1,545	1,700
	1,388	1,560	1,998	2,268
Credit derivatives	–	5	–	12
Other contracts	150	179	184	184
	2,764	2,886	3,794	3,641
Total gross fair values before:	95,247	90,787	163,575	159,764
Valuation adjustments determined on a pooled basis	(625)	34	(725)	68
Impact of netting agreements that qualify for balance sheet offset	(583)	(583)	(67,827)	(67,705)
	94,039	90,238	95,023	92,127
Impact of netting agreements that do not qualify for balance sheet offset (1)	(57,010)	(57,010)	(58,804)	(58,804)
	$ 37,029	$ 33,228	$ 36,219	$ 33,323

(1) Additional impact of offsetting credit exposures on contracts that do not qualify for balance sheet offset.

Fair value of derivative instruments by term to maturity

(Millions of Canadian dollars)	October 31, 2018 Less than 1 year	October 31, 2018 1 through 5 years	October 31, 2018 Over 5 years	October 31, 2018 Total	October 31, 2017 Less than 1 year	October 31, 2017 1 through 5 years	October 31, 2017 Over 5 years	October 31, 2017 Total
	As at							
Derivative assets	$ 28,241	$ 29,197	$ 36,601	$ 94,039	$ 26,292	$ 28,810	$ 39,921	$ 95,023
Derivative liabilities	26,720	27,013	36,505	90,238	26,414	26,334	39,379	92,127

Derivative-related credit risk

Credit risk from derivative transactions is generated by the potential for the counterparty to default on its contractual obligations when one or more transactions have a positive market value to us. Therefore, derivative-related credit risk is represented by the positive fair value of the instrument and is normally a small fraction of the contract's notional amount.

We subject our derivative transactions to the same credit approval, limit and monitoring standards that we use for managing other transactions that create credit exposure. This includes evaluating the creditworthiness of counterparties, and managing the size, diversification and maturity structure of the portfolio. Credit utilization for all products is compared with established limits on a continual basis and is subject to a standard exception reporting process. We use a single internal rating system for all credit risk exposure. In most cases, these internal ratings approximate the external risk ratings of public rating agencies.

Offsetting is a technique that can reduce credit exposure from derivatives and is generally facilitated through the use of master netting agreements and achieved when specific criteria are met in accordance with our accounting policy in Note 2. A master netting agreement provides for a single net settlement of all financial instruments covered by the agreement in the event of default. However, credit risk is reduced only to the extent that our financial obligations to the same counterparty can be set off against obligations of the counterparty to us. We maximize the use of master netting agreements to reduce derivative-related credit exposure. Our overall exposure to credit risk that is reduced through master netting agreements may change substantially following the reporting date as the exposure is affected by each transaction subject to the agreement as well as by changes in underlying market rates. Measurement of our credit exposure arising out of derivative transactions is reduced to reflect the effects of netting in cases where the enforceability of that netting is supported by appropriate legal analysis as documented in our trading credit risk policies.

The use of collateral is another significant credit mitigation technique for managing derivative-related counterparty credit risk. Mark-to-market provisions in our agreements with some counterparties, typically in the form of a Credit Support Annex, provide us with the right to request that the counterparty pay down or collateralize the current market value of its derivatives positions when the value passes a specified threshold amount.

Replacement cost represents the total fair value of all outstanding contracts in a gain position after factoring in the master netting agreements. The credit equivalent amount is defined as the sum of the replacement cost plus an add-on amount for potential future credit exposure as defined by OSFI. The risk-weighted amount is determined by applying OSFI's non-modelled current exposure measure of counterparty risk to the credit equivalent amount.

Derivative-related credit risk

	As at					
	October 31, 2018 (1)			October 31, 2017 (1)		
(Millions of Canadian dollars)	Replacement cost	Credit equivalent amount (2)	Risk-weighted equivalent (3)	Replacement cost	Credit equivalent amount (2)	Risk-weighted equivalent (3)
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	$ 307	$ 324	$ 13	$ 264	$ 328	$ 59
Swaps	9,671	20,321	3,363	10,890	24,318	4,187
Options purchased	610	857	407	283	883	527
Foreign exchange contracts						
Forward contracts	4,589	10,944	3,439	5,421	11,555	3,634
Swaps	9,342	13,718	5,002	10,476	12,643	4,498
Options purchased	443	1,100	478	360	1,125	472
Credit derivatives (4)	71	770	153	109	936	149
Other contracts	9,709	9,959	4,303	7,750	6,332	2,945
Exchange-traded contracts	2,912	11,285	225	1,391	8,340	167
	$ 37,654	$ 69,278	$ 17,383	$ 36,944	$ 66,460	$ 16,638

(1) The amounts presented are net of master netting agreements in accordance with Basel III.
(2) The total credit equivalent amount includes collateral applied of $16 billion (October 31, 2017 – $18 billion).
(3) The risk-weighted balances are calculated in accordance with Basel III.
(4) Excludes credit derivatives issued for other-than-trading purposes related to bought protection.

Replacement cost of derivative instruments by risk rating and by counterparty type

	As at October 31, 2018								
	Risk rating (1)					Counterparty type (2)			
(Millions of Canadian dollars)	AAA, AA	A	BBB	BB or lower	Total	Banks	OECD governments	Other	Total
Gross positive replacement cost	$ 25,458	$ 32,693	$ 21,215	$15,881	$ 95,247	$ 42,937	$ 18,749	$ 33,561	$ 95,247
Impact of master netting agreements	14,544	24,255	15,046	3,748	57,593	36,081	8,348	13,164	57,593
Replacement cost (after netting agreements)	$ 10,914	$ 8,438	$ 6,169	$12,133	$ 37,654	$ 6,856	$ 10,401	$ 20,397	$ 37,654

	As at October 31, 2017								
	Risk rating (1)					Counterparty type (2)			
(Millions of Canadian dollars)	AAA, AA	A	BBB	BB or lower	Total	Banks	OECD governments	Other	Total
Gross positive replacement cost	$ 26,707	$ 108,320	$ 19,672	$ 8,876	$ 163,575	$ 45,723	$ 18,694	$ 99,158	$ 163,575
Impact of master netting agreements	14,468	98,605	10,167	3,391	126,631	38,508	8,342	79,781	126,631
Replacement cost (after netting agreements)	$ 12,239	$ 9,715	$ 9,505	$ 5,485	$ 36,944	$ 7,215	$ 10,352	$ 19,377	$ 36,944

(1) Our internal risk ratings for major counterparty types approximate those of public ratings agencies. Ratings of AAA, AA, A and BBB represent investment grade ratings and ratings of BB or lower represent non-investment grade ratings.
(2) Counterparty type is defined in accordance with the capital adequacy requirements of OSFI.

Derivatives in hedging relationships

We apply hedge accounting to minimize volatility in earnings and capital caused by changes in interest rates or foreign exchange rates. Interest rate and currency fluctuations will either cause assets and liabilities to appreciate or depreciate in market value or cause variability in forecasted cash flows. When a hedging relationship is effective, gains, losses, revenue and expenses of the hedging instrument will offset the gains, losses, revenue and expenses of the hedged item.

Derivatives used in hedging relationships are recorded in Other Assets – Derivatives or Other Liabilities – Derivatives on the Balance Sheet. Foreign currency-denominated liabilities used in net investment hedging relationships are recorded in Deposits – Business and Government and Subordinated debentures on the Balance Sheet. Gains and losses relating to hedging ineffectiveness is recorded in Non-Interest income and amounts reclassified from hedge reserves in OCI to income is recorded in Net-interest income for Cash flow hedges and Non-interest income for Net Investment hedges.

We assess and measure the effectiveness of a hedging relationship based on the change in the fair value or cash flows of the derivative hedging instrument relative to the change in the fair value or cash flows of the hedged item attributable to the hedged risk. When cash instruments are designated as hedges of foreign exchange risks, only changes in their value due to foreign exchange risk are included in the assessment and measurement of hedge effectiveness.

Potential sources of ineffectiveness can be attributed to differences between hedging instruments and hedged items:

- Mismatches in the terms of hedged items and hedging instruments, for example the frequency and timing of when interest rates are reset and frequency of payment.
- Difference in the discounting factors between the hedged item and the hedging instrument, taking into consideration the different reset frequency of the hedged item and hedging instrument.
- Hedging derivatives with a non-zero fair value at inception date of the hedging relationship, resulting in mismatch in terms with the hedged item.

Below is a description of our risk management strategy for each risk exposure that we decide to hedge:

Interest rate risk

We use interest rate contracts to manage our exposure to interest rate risk by modifying the repricing characteristics of existing and/or forecasted assets and liabilities, including funding and investment activities. The swaps are designated in either a fair value hedge or a cash flow hedge.

For fair value hedges, we use interest rate contracts to manage the fair value movements of our fixed-rate instruments due to changes in benchmark interest. The interest rate swaps are entered into on a one-to-one basis to manage the benchmark interest rate risk, and its terms are critically matched to the specified fixed rate instruments.

We also use interest rate swaps in fair value hedges to manage interest rate risk from residential mortgage assets and funding liabilities. Our exposure from this portfolio changes with the origination of new loans, repayments of existing loans, and sale of securitized mortgages. Accordingly, dynamic hedging is adopted for that portfolio, in which the hedge relationship is rebalanced on a more frequent basis, such as on a bi-weekly or on a monthly basis.

For cash flow hedges, we use interest rate swaps to manage the exposure to cash flow variability of our variable rate instruments as a result of changes in benchmark interest rates. Whilst some of the interest rate derivatives are entered into on a one-to-one basis to manage a specific exposure, other interest rate derivatives may be entered into for managing interest rate risks of a portfolio of assets and liabilities.

Foreign exchange risk

We manage our exposure to foreign currency risk with cross currency swaps in a cash flow hedge, and foreign exchange forward contracts in a net investment hedge. Certain cash instruments may also be designated in a net investment hedge, where applicable.

For cash flow hedges, we predominately use cross currency swaps to manage the cash flow variability arising from fluctuations in foreign exchange rates on our issued foreign denominated fixed rate liabilities. The maturity profile and repayment terms of these swaps are matched to those of our foreign denominated assets and liabilities to limit our cash flow volatility from changes in foreign exchange rates.

For net investment hedges, we use a combination of foreign exchange forwards and cash instruments, such as foreign denominated deposit liabilities to manage our foreign exchange risk arising from our investments in foreign operations. Our most significant exposures include U.S. dollar, British pound and Euro. When hedging net investments in foreign operations using foreign exchange forwards, only the undiscounted spot element of the foreign exchange forward is designated as the hedging instrument. Accordingly, changes in the fair value of the hedging instrument as a result of changes in forward rates and the effects of discounting are not included in the hedging effectiveness assessment. Foreign operations are only hedged to the extent of the liability or notional amount of the derivative; we generally do not expect to incur significant ineffectiveness on hedges of net investments in foreign operations.

Equity price risk

We use total return swaps in cash flow hedges to mitigate the cash flow variability of the expected payment associated with our cash settled share-based compensation plan for certain key employees by exchanging interest payments for indexed RBC share price change and dividend returns.

Credit risk

We predominantly use credit derivatives to economically hedge our credit exposures. We mitigate industry sector concentrations and single-name exposures related to our credit portfolio by purchasing credit derivatives to transfer credit risk to third parties.

Derivative instruments designated in hedging relationships

The following table presents the fair values of the derivative instruments and the principal amounts of the non-derivative liabilities, categorized by their hedging relationships, as well as derivatives that are not designated in hedging relationships.

Derivatives and non-derivative instruments

	As at							
	October 31, 2018				October 31, 2017			
	Designated as hedging instruments in hedging relationships				Designated as hedging instruments in hedging relationships			
(Millions of Canadian dollars)	Fair Value	Cash Flow	Net investment	Not designated in a hedging relationship	Fair Value	Cash Flow	Net investment	Not designated in a hedging relationship
Assets								
Derivative instruments	$ 642	$ 809	$ 13	$ 92,575	$ 736	$ 482	$ 41	$ 93,764
Liabilities								
Derivative instruments	1,437	598	28	88,175	740	499	246	90,642
Non-derivative instruments	–	–	25,565	n.a.	–	–	19,950	n.a.

n.a. not applicable

The following tables provide the maturity analysis of the notional amounts and the weighted average rates of the hedging instruments and their carrying amounts by types of hedging relationships:

Fair value hedges

	IFRS 9					
	As at October 31, 2018					
	Notional amounts				Carrying amount	
(Millions of Canadian dollars, except average rates)	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	$ 2,518	$ 12,778	$ 4,668	$ 19,964	$ 498	$ 8
Hedge of fixed rate liabilities	14,946	47,658	7,432	70,036	144	1,429
Weighted average fixed interest rate						
Hedge of fixed rate assets	1.1%	2.4%	2.8%	2.3%		
Hedge of fixed rate liabilities	1.6%	1.8%	1.8%	1.8%		

Cash flow hedges

	IFRS 9					
	As at October 31, 2018					
	Notional amounts				Carrying amount	
(Millions of Canadian dollars, except average rates)	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of variable rate assets	$ 12,686	$ 12,805	$ 1,615	$ 27,106	$ 1	$ 184
Hedge of variable rate liabilities	2,000	38,256	3,978	44,234	796	1
Weighted average fixed interest rate						
Hedge of variable rate assets	2.2%	2.4%	2.7%	2.3%		
Hedge of variable rate liabilities	2.1%	1.9%	2.5%	2.0%		
Foreign exchange risk						
Cross currency swaps	$ 326	$ 2,978	$ 153	$ 3,457	$ 12	$ 368
Weighted average CAD-CHF exchange rate	1.27	–	–	1.27		
Weighted average CAD-EUR exchange rate	–	–	1.52	1.52		
Weighted average USD-EUR exchange rate	–	1.33	–	1.33		

Net investment hedges

	IFRS 9					
	As at October 31, 2018					
	Notional/Principal				Carrying amount	
(Millions of Canadian dollars, except average rates)	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Foreign exchange risk						
Foreign currency liabilities	$ 3,457	$ 18,233	$ 3,875	$ 25,565	$ –	$ 25,043
Weighted average CAD-USD exchange rate	1.20	1.28	1.31	1.27		
Weighted average CAD-EUR exchange rate	–	–	1.53	1.53		
Weighted average CAD-GBP exchange rate	1.91	1.69	–	1.73		
Forward contracts	$ 3,372	$ –	$ –	$ 3,372	$ 13	$ 28
Weighted average CAD-USD exchange rate	1.31	–	–	1.31		
Weighted average CAD-EUR exchange rate	1.49	–	–	1.49		
Weighted average CAD-GBP exchange rate	1.68	–	–	1.68		

The following table indicates the periods when the cash flows are expected to occur and when they are expected to affect profit or loss for cash flow hedges:

	IAS 39					
	As at October 31, 2017					
(Millions of Canadian dollars)	Within 1 year	1 to 2 years	2 to 3 years	3 to 5 years	Over 5 years	Total
Cash inflows from assets	$ 938	$ 243	$ 151	$ 59	$ 98	$ 1,489
Cash outflows from liabilities	(1,070)	(939)	(3,501)	(476)	(71)	(6,057)
Net cash flows	$ (132)	$ (696)	$ (3,350)	$ (417)	$ 27	$ (4,568)

The following tables present the details of the hedged items categorized by their hedging relationships:

Fair value hedges – assets and liabilities designated as hedged items

	IFRS 9					
	As at and for the year ended October 31, 2018					
	Carrying amount		Accumulated amount of fair value adjustments on the hedged item included in the carrying amount			
(Millions of Canadian dollars)	Assets	Liabilities	Assets	Liabilities	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness
Interest rate risk						
Fixed rate assets (1)	$ 20,172	$ –	$ (529)	$ –	Investment securities; Loans – Retail	$ (650)
Fixed rate liabilities (1)	–	68,714	–	(1,302)	Deposits – Business and government; Subordinated debentures	1,018

(1) As at October 31, 2018, the accumulated amount of fair value hedge adjustments remaining in the Balance Sheet for hedged items that have ceased to be adjusted for hedging gains and losses is a loss of $105 million for fixed-rate assets and a loss of $277 million for fixed-rate liabilities.

Cash flow and net investment hedges – assets and liabilities designated as hedged items

	IFRS 9			
	As at and for the year ended October 31, 2018			
			Cash flow hedge/foreign currency translation reserve	
(Millions of Canadian dollars)	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness	Continuing hedges	Discontinued hedges
Cash flow hedges				
Interest rate risk				
Variable rate assets	Investment securities; Loans – Retail	$ 308	$ (187)	$ (171)
Variable rate liabilities	Deposits – Business and government; Subordinated debentures	(769)	706	477
Foreign exchange risk				
Fixed rate assets	Loans – Retail	19	(4)	–
Fixed rate liabilities	Deposits – Business and government	60	95	–
Net investment hedges				
Foreign exchange risk				
Foreign subsidiaries	n.a.	315	(5,365)	(923)

n.a. not applicable

Effectiveness of designated hedging relationships

	IFRS 9			
	For the year ended October 31, 2018			
(Millions of Canadian dollars)	Change in fair value of hedging instrument	Hedge ineffectiveness recognized in income (1)	Changes in the value of the hedging instrument recognized in OCI	Amount reclassified from hedge reserves to income
Fair value hedges				
Interest rate risk				
Interest rate contracts – fixed rate assets	$ 605	$ (45)	$ –	$ –
Interest rate contracts – fixed rate liabilities	(1,000)	18	–	–
Cash flow hedges				
Interest rate risk				
Interest rate contracts – variable rate assets	(318)	(11)	(275)	(37)
Interest rate contracts – variable rate liabilities	751	(1)	674	101
Foreign exchange risk				
Cross currency swap – fixed rate assets	(19)	–	(10)	(7)
Cross currency swap – fixed rate liabilities	(61)	–	(137)	(165)
Net investment hedges				
Foreign exchange risk				
Foreign currency liabilities	(331)	–	(331)	–
Forward contracts	16	–	17	–

(1) Hedge ineffectiveness recognized in income included losses of $46 million that are excluded from the assessment of hedge effectiveness and are offset by economic hedges.

Results of hedge activities recorded in Net income and Other comprehensive income

(Millions of Canadian dollars)	IAS 39 October 31 2017
Fair value hedges	
Gains (losses) on hedging instruments (1)	$ (1,076)
Gains (losses) on hedged items attributable to the hedged risk (1)	991
Ineffective portion (1) (2)	(85)
Cash flow hedges	
Ineffective portion (1)	(1)
Effective portion (3)	622
Reclassified to income during the period (4)	95
Net investment hedges	
Ineffective portion (1)	–
Foreign currency gains (losses) (3)	(1,570)
Gains (losses) from hedges (3)	438

(1) Amounts are recorded in Non-interest income.
(2) Amounts include losses of $82 million that are excluded from the assessment of hedge effectiveness and are offset by economic hedges.
(3) Amounts are included in OCI, net of taxes.
(4) After-tax gains of $70 million were reclassified from Other components of equity to Net interest income during the year ended October 31, 2017.

Reconciliation of components of equity

The following table provides a reconciliation by risk category of each component of equity and an analysis of other comprehensive income relating to hedge accounting:

	IFRS 9	
	For the year ended October 31, 2018	
(Millions of Canadian dollars)	Cash flow hedge reserve	Foreign currency translation reserve
Balance at the beginning of the year	$ 431	$ 3,545
Cash flow hedges		
Effective portion of changes in fair value:		
Interest rate risk	399	
Foreign exchange risk	(147)	
Equity price risk	(18)	
Net amount reclassified to profit or loss:		
Ongoing hedges:		
Interest rate risk	44	
Foreign exchange risk	172	
Equity price risk	7	
De-designated hedges:		
Interest rate risk	(108)	
Foreign exchange risk	–	
Net gain on hedge of net investment in foreign operations		
Foreign exchange denominated debt		(331)
Forward foreign exchange contracts		17
Foreign currency translation differences for foreign operations		841
Tax on movements on reserves during the period	(92)	75
Balance at the end of the year	$ 688	$ 4,147

Note 9 Premises and equipment

	For the year ended October 31, 2018						
(Millions of Canadian dollars)	Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Total
Cost							
Balance at beginning of period	$ 157	$ 1,363	$ 1,875	$ 1,314	$ 2,586	$ 153	$ 7,448
Additions (1)	–	–	255	43	61	374	733
Transfers from work in process	–	7	44	56	184	(291)	–
Disposals	(5)	(17)	(50)	(41)	(73)	–	(186)
Foreign exchange translation	1	5	4	4	8	–	22
Other	–	41	(5)	(3)	(40)	28	21
Balance at end of period	$ 153	$ 1,399	$ 2,123	$ 1,373	$ 2,726	$ 264	$ 8,038
Accumulated depreciation							
Balance at beginning of period	$ –	$ 608	$ 1,367	$ 984	$ 1,819	$ –	$ 4,778
Depreciation	–	44	246	100	179	–	569
Disposals	–	(10)	(48)	(34)	(55)	–	(147)
Foreign exchange translation	–	2	1	2	6	–	11
Other	–	25	(10)	(1)	(19)	–	(5)
Balance at end of period	$ –	$ 669	$ 1,556	$ 1,051	$ 1,930	$ –	$ 5,206
Net carrying amount at end of period	$ 153	$ 730	$ 567	$ 322	$ 796	$ 264	$ 2,832

(Millions of Canadian dollars)	For the year ended October 31, 2017 Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Total
Cost							
Balance at beginning of period	$ 171	$ 1,379	$ 1,686	$ 1,352	$ 2,566	$ 132	$ 7,286
Additions (1)	–	1	211	25	43	226	506
Transfers from work in process	–	7	43	37	96	(183)	–
Disposals	(9)	(23)	(90)	(47)	(68)	–	(237)
Foreign exchange translation	(4)	(9)	(11)	(7)	(18)	–	(49)
Other	(1)	8	36	(46)	(33)	(22)	(58)
Balance at end of period	$ 157	$ 1,363	$ 1,875	$ 1,314	$ 2,586	$ 153	$ 7,448
Accumulated depreciation							
Balance at beginning of period	$ –	$ 570	$ 1,209	$ 961	$ 1,710	$ –	$ 4,450
Depreciation	–	74	229	111	186	–	600
Disposals	–	(15)	(89)	(44)	(61)	–	(209)
Foreign exchange translation	–	(2)	(8)	(3)	(12)	–	(25)
Other	–	(19)	26	(41)	(4)	–	(38)
Balance at end of period	$ –	$ 608	$ 1,367	$ 984	$ 1,819	$ –	$ 4,778
Net carrying amount at end of period	$ 157	$ 755	$ 508	$ 330	$ 767	$ 153	$ 2,670

(1) As at October 31, 2018, we had total contractual commitments of $273 million to acquire premises and equipment (October 31, 2017 – $268 million).

Note 10 Goodwill and other intangible assets

Goodwill

(Millions of Canadian dollars)	For the year ended October 31, 2018 Canadian Banking	Caribbean Banking	Canadian Wealth Management	Global Asset Management	U.S. Wealth Management (including City National)	International Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Total
Balance at beginning of period	$ 2,527	$ 1,694	$ 576	$ 2,006	$ 2,745	$ 120	$ 112	$ 148	$ 1,049	$ 10,977
Acquisitions	1	–	–	–	80	–	–	–	–	81
Dispositions	–	–	–	–	(8)	–	–	–	–	(8)
Currency translations	–	35	3	(20)	53	(2)	–	–	18	87
Balance at end of period	$ 2,528	$ 1,729	$ 579	$ 1,986	$ 2,870	$ 118	$ 112	$ 148	$ 1,067	$ 11,137

(Millions of Canadian dollars)	For the year ended October 31, 2017 Canadian Banking	Caribbean Banking	Canadian Wealth Management	Global Asset Management	U.S. Wealth Management (including City National)	International Wealth Management	Insurance	Investor & Treasury Services	Capital Markets	Total
Balance at beginning of period	$ 2,527	$ 1,771	$ 582	$ 1,963	$ 2,854	$ 115	$ 112	$ 148	$ 1,084	$ 11,156
Acquisitions	–	–	–	–	–	–	–	–	–	–
Dispositions	–	–	–	–	(2)	–	–	–	–	(2)
Currency translations	–	(77)	(6)	43	(107)	5	–	–	(35)	(177)
Balance at end of period	$ 2,527	$ 1,694	$ 576	$ 2,006	$ 2,745	$ 120	$ 112	$ 148	$ 1,049	$ 10,977

We perform our annual impairment test by comparing the carrying amount of each CGU to its recoverable amount. The recoverable amount of a CGU is represented by its value in use, except in circumstances where the carrying amount of a CGU exceeds its value in use. In such cases, the greater of the CGU's fair value less costs of disposal and its value in use is the recoverable amount. Our annual impairment test is performed as at August 1.

In our 2018 and 2017 annual impairment tests, the recoverable amounts of our Caribbean Banking and International Wealth Management CGUs were based on their fair value less costs of disposal. The recoverable amounts of all other CGUs tested were based on their value in use.

Value in use

We calculate value in use using a five-year discounted cash flow method, with the exception of our U.S. Wealth Management (including City National) CGU where cash flow projections covering a seven-year period were used, which more closely aligns with the strategic growth plan resulting from the acquisition of City National. Future cash flows are based on financial plans agreed by management, estimated based on forecast results, business initiatives, capital required to support future cash flows and returns to shareholders. Key drivers of future cash flows include net interest margins and average interest-earning assets. The values assigned to these drivers over the forecast period are based on past experience, external and internal economic forecasts, and management's expectations of the impact of economic conditions on our financial results. Beyond the initial cash flow projection period, cash flows are assumed to increase at a constant rate using a nominal long-term growth rate (terminal growth rate). Terminal growth rates are based on the current market assessment of gross domestic product and inflation for the countries within which the CGU operates. The discount rates used to determine the present value of each CGU's projected future cash flows are based on the bank-wide cost of capital, adjusted for the risks to which each CGU is exposed. CGU-specific risks include: country risk, business/operational risk, geographic risk (including political risk, devaluation risk, and government regulation), currency risk, and price risk (including product pricing risk and inflation).

The estimation of value in use involves significant judgment in the determination of inputs to the discounted cash flow model and is most sensitive to changes in future cash flows, discount rates and terminal growth rates applied to cash flows beyond the forecast period. The sensitivity of key inputs and assumptions used was tested by recalculating the recoverable amount using reasonably possible variances to those assumptions. The post-tax discount rates were increased by 1%, terminal growth rates were decreased by 1%, and future cash flows were reduced by 10%. As at August 1, 2018, no reasonably possible change in an individual key input or assumption, as described, would result in a CGU's carrying amount exceeding its recoverable amount based on value in use.

The terminal growth rates and pre-tax discount rates used in our discounted cash flow models are summarized below.

	As at			
	August 1, 2018		August 1, 2017	
	Discount rate (1)	**Terminal growth rate**	Discount rate (1)	Terminal growth rate
Group of cash generating units				
Canadian Banking	**10.5%**	**3.0%**	10.1%	3.0%
Caribbean Banking	**11.8**	**4.3**	12.0	4.3
Canadian Wealth Management	**10.7**	**3.0**	11.2	3.0
Global Asset Management	**10.6**	**3.0**	11.1	3.0
U.S. Wealth Management (including City National)	**10.5**	**3.0**	13.4	3.0
International Wealth Management	**9.2**	**3.0**	10.5	3.0
Insurance	**10.5**	**3.0**	10.6	3.0
Investor & Treasury Services	**10.8**	**3.0**	11.0	3.0
Capital Markets	**10.9**	**3.0**	15.0	3.0

(1) Pre-tax discount rates are determined implicitly based on post-tax discount rates.

Fair value less costs of disposal – Caribbean Banking

For our Caribbean Banking CGU, we calculated fair value less costs of disposal using a discounted cash flow method that projects future cash flows over a 5-year period. Cash flows are based on management forecasts, adjusted to approximate the considerations of a prospective third-party buyer. Cash flows beyond the initial 5-year period are assumed to increase at a constant rate using a nominal long-term growth rate. Future cash flows, terminal growth rates, and discount rates are based on the same factors noted above. This fair value measurement is categorized as level 3 in the fair value hierarchy as certain significant inputs are not observable.

We use significant judgement to determine inputs to the discounted cash flow model which is most sensitive to changes in future cash flows, discount rates and terminal growth rates applied to cash flows beyond the forecast period. The sensitivity of these key inputs was tested by applying a reasonably possible change to these assumptions. As at August 1, 2018, the recoverable amount of our Caribbean Banking CGU, based on fair value less costs of disposal, was 129% of its carrying amount. If the post-tax discount rate was increased by 1.8%, holding other individual factors constant, the recoverable amount would approximate the carrying amount. No other reasonably possible change in an individual key input or assumption, including decreasing the terminal growth rates by 2.5% or reducing future cash flows by 22%, would result in the CGU's carrying amount exceeding its recoverable amount based on fair value less costs of disposal.

Fair value less costs of disposal – International Wealth Management

For our International Wealth Management CGU, we calculated fair value less costs of disposal using a multiples-based approach. Each business within the CGU was valued using either a Price-to-assets-under-administration (P/AUA) or Price-to-revenue (P/Rev) multiple, as appropriate, to reflect the considerations of a prospective third-party buyer. In 2018 and 2017, we applied a P/AUA multiple of 2.5% to AUA as at August 1 and a P/Rev multiple of 2.5x to revenue for the 12 months preceding the testing date. These multiples represent our best estimate from a range of reasonably possible inputs based on precedent transactions for comparable businesses. This fair value measurement is categorized as level 3 in the fair value hierarchy as certain significant inputs are not observable.

The estimation of fair value less costs of disposal involves significant judgment in the determination of the appropriate valuation approach and inputs and is most sensitive to changes in the P/AUA and P/Rev multiples. These key inputs were tested for sensitivity by reducing each multiple to the low end of the range of reasonably possible inputs considered. As at August 1, 2018, no reasonably possible change in an individual key input or assumption, as described, would result in the CGU's carrying amount exceeding its recoverable amount based on fair value less costs of disposal.

Other intangible assets

(Millions of Canadian dollars)	Internally generated software	Other software	Core deposit intangibles	Customer list and relationships	In process software	Total
	For the year ended October 31, 2018					
Gross carrying amount						
Balance at beginning of period	$ 5,143	$ 1,432	$ 1,715	$ 1,753	$ 892	$ 10,935
Additions	40	79	–	–	1,111	1,230
Acquisitions through business combination	–	–	–	16	–	16
Transfers	798	51	–	–	(849)	–
Dispositions	(1)	(1)	–	–	(2)	(4)
Impairment losses	(1)	–	–	–	(7)	(8)
Currency translations	16	11	35	(1)	4	65
Other changes	(11)	10	–	–	(3)	(4)
Balance at end of period	$ 5,984	$ 1,582	$ 1,750	$ 1,768	$ 1,146	$ 12,230
Accumulated amortization						
Balance at beginning of period	$ (3,825)	$ (1,094)	$ (487)	$ (1,022)	$ –	$ (6,428)
Amortization charge for the year	(669)	(112)	(153)	(143)	–	(1,077)
Dispositions	1	1	–	–	–	2
Currency translations	(11)	(7)	(14)	3	–	(29)
Other changes	3	(14)	–	–	–	(11)
Balance at end of period	$ (4,501)	$ (1,226)	$ (654)	$ (1,162)	$ –	$ (7,543)
Net balance at end of period	$ 1,483	$ 356	$ 1,096	$ 606	$ 1,146	$ 4,687

(Millions of Canadian dollars)	Internally generated software	Other software	Core deposit intangibles	Customer list and relationships	In process software	Total
	For the year ended October 31, 2017					
Gross carrying amount						
Balance at beginning of period	$ 4,435	$ 1,389	$ 1,784	$ 1,761	$ 778	$ 10,147
Additions	26	70	–	–	896	992
Acquisitions through business combinations	–	–	–	–	–	–
Transfers	692	60	–	–	(752)	–
Dispositions	–	(8)	–	–	(2)	(10)
Impairment losses	(2)	(12)	–	–	–	(14)
Currency translations	(22)	(16)	(69)	6	(5)	(106)
Other changes	14	(51)	–	(14)	(23)	(74)
Balance at end of period	$ 5,143	$ 1,432	$ 1,715	$ 1,753	$ 892	$ 10,935
Accumulated amortization						
Balance at beginning of period	$ (3,223)	$ (1,054)	$ (348)	$ (874)	$ –	$ (5,499)
Amortization charge for the year	(595)	(111)	(156)	(153)	–	(1,015)
Dispositions	–	7	–	–	–	7
Currency translations	15	10	17	(10)	–	32
Other changes	(22)	54	–	15	–	47
Balance at end of period	$ (3,825)	$ (1,094)	$ (487)	$ (1,022)	$ –	$ (6,428)
Net balance at end of period	$ 1,318	$ 338	$ 1,228	$ 731	$ 892	$ 4,507

Note 11 Joint ventures and associated companies

The following table summarizes the carrying value of our interests in joint ventures and associated companies accounted for under the equity method as well as our share of the income of those entities.

	Joint ventures		Associated companies	
	As at and for the year ended			
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017	**October 31 2018**	October 31 2017
Carrying amount	**$ 165**	$ 164	**$ 521**	$ 526
Share of:				
Net income	**113**	328	**(92)**	7
Other comprehensive income	**–**	(8)	**–**	–
	$ 113	$ 320	**$ (92)**	$ 7

We do not have any joint ventures or associated companies that are individually material to our financial results.

During the year ended October 31, 2018, we recognized impairment losses of $12 million with respect to our interests in joint ventures and associated companies (October 31, 2017 – impairment losses of $4 million).

Certain of our subsidiaries, joint ventures and associates are subject to regulatory requirements of the jurisdictions in which they operate. When these subsidiaries, joint ventures and associates are subject to such requirements, they may be restricted from transferring to us our share of their assets in the form of cash dividends, loans or advances. As at October 31, 2018, restricted net assets of these subsidiaries, joint ventures and associates were $33.9 billion (October 31, 2017 – $29.4 billion).

Note 12 Other assets

(Millions of Canadian dollars)	As at October 31 2018	October 31 2017
Cash collateral	$ 14,467	$ 13,657
Margin deposits	4,940	5,867
Receivable from brokers, dealers and clients	2,868	1,870
Accounts receivable and prepaids	4,047	3,574
Investments in joint ventures and associates	686	690
Employee benefit assets	626	59
Insurance-related assets		
Collateral loans	991	1,103
Policy loans	99	95
Reinsurance assets	656	549
Other	163	268
Deferred income tax asset	1,475	1,732
Taxes receivable	5,456	3,031
Accrued interest receivable	2,641	2,111
Precious metals	361	1,082
Other	4,588	3,271
	$ 44,064	$ 38,959

Note 13 Deposits

	As at							
	October 31, 2018				October 31, 2017			
(Millions of Canadian dollars)	Demand (1)	Notice (2)	Term (3)	Total	Demand (1)	Notice (2)	Term (3)	Total
Personal	$ 135,101	$ 48,873	$ 86,180	$ 270,154	$ 134,184	$ 47,366	$ 78,663	$ 260,213
Business and government	238,617	8,606	287,148	534,371	229,337	9,520	266,808	505,665
Bank	8,750	299	23,472	32,521	8,587	158	15,012	23,757
	$ 382,468	$ 57,778	$ 396,800	$ 837,046	$ 372,108	$ 57,044	$ 360,483	$ 789,635
Non-interest-bearing (4)								
Canada	$ 88,119	$ 5,086	$ –	$ 93,205	$ 84,498	$ 4,871	$ –	$ 89,369
United States	34,098	–	–	34,098	34,441	90	–	34,531
Europe (5)	564	–	–	564	616	–	–	616
Other International	5,495	5	–	5,500	6,059	5	–	6,064
Interest-bearing (4)								
Canada	213,747	15,112	292,641	521,500	212,456	14,990	274,934	502,380
United States	2,478	33,099	67,211	102,788	847	32,263	55,840	88,950
Europe (5)	32,930	1,412	26,598	60,940	30,148	1,585	19,613	51,346
Other International	5,037	3,064	10,350	18,451	3,043	3,240	10,096	16,379
	$ 382,468	$ 57,778	$ 396,800	$ 837,046	$ 372,108	$ 57,044	$ 360,483	$ 789,635

(1) Demand deposits are deposits for which we do not have the right to require notice of withdrawal, which includes both savings and chequing accounts.
(2) Notice deposits are deposits for which we can legally require notice of withdrawal. These deposits are primarily savings accounts.
(3) Term deposits are deposits payable on a fixed date, and include term deposits, guaranteed investment certificates and similar instruments.
(4) The geographical splits of the deposits are based on the point of origin of the deposits and where the revenue is recognized. As at October 31, 2018, deposits denominated in U.S. dollars, British pounds, Euro and other foreign currencies were $309 billion, $20 billion, $38 billion and $32 billion, respectively (October 31, 2017 – $283 billion, $16 billion, $37 billion and $29 billion).
(5) Europe includes the United Kingdom, Luxembourg and the Channel Islands.

The following table presents the contractual maturities of our term deposit liabilities.

(Millions of Canadian dollars)	As at October 31 2018	October 31 2017
Within 1 year:		
less than 3 months	$ 89,553	$ 71,841
3 to 6 months	59,109	41,221
6 to 12 months	80,773	82,588
1 to 2 years	51,798	52,033
2 to 3 years	45,550	40,400
3 to 4 years	21,127	30,062
4 to 5 years	23,863	18,745
Over 5 years	25,027	23,593
	$ 396,800	$ 360,483
Aggregate amount of term deposits in denominations of one hundred thousand dollars or more	$ 335,000	$ 328,000

The following table presents the average deposit balances and average rates of interest.

(Millions of Canadian dollars, except for percentage amounts)	For the year ended October 31, 2018 Average balances	October 31, 2018 Average rates	October 31, 2017 Average balances	October 31, 2017 Average rates
Canada	$ 603,582	1.28%	$ 581,059	0.96%
United States	131,715	1.00	112,551	0.57
Europe	60,647	0.51	53,928	0.25
Other International	23,788	1.11	22,778	1.01
	$ 819,732	1.17%	$ 770,316	0.85%

Note 14 Insurance

Risk management

Insurance risk is the risk of fluctuations in the timing, frequency or severity of insured events, relative to our expectations at the time of underwriting. We do not have a high degree of concentration risk due to our geographic diversity and business mix. Concentration risk is not a major concern for the life and health insurance business as it does not have a material level of region-specific characteristics like those exhibited in the property and casualty insurance business. Exposure to concentrations of insurance risks for the property and casualty business is not significant. Reinsurance is also used for all insurance businesses to lower our risk profile and limit the liability on a single claim. We manage underwriting and pricing risk through the use of underwriting guidelines which detail the class, nature and type of business that may be accepted, pricing policies by product line and centralized control of policy wordings. The risk that claims are handled or paid inappropriately is mitigated by using a range of IT system controls and manual processes conducted by experienced staff. These, together with a range of detailed policies and procedures, ensure that all claims are handled in a timely, appropriate and accurate manner.

Reinsurance

In the ordinary course of business, our insurance operations reinsure risks to other insurance and reinsurance companies in order to lower our risk profile, limit loss exposure to large risks, and provide additional capacity for future growth. These ceding reinsurance arrangements do not relieve our insurance subsidiaries from their direct obligations to the insured. We evaluate the financial condition of the reinsurers and monitor our concentrations of credit risks to minimize our exposure to losses from reinsurer insolvency. Reinsurance amounts (ceded premiums) included in Non-interest income are shown in the table below.

Net premiums and claims

(Millions of Canadian dollars)	For the year ended October 31 2018	October 31 2017
Gross premiums	$ 4,236	$ 4,215
Premiums ceded to reinsurers	(204)	(340)
Net premiums	$ 4,032	$ 3,875
Gross claims and benefits	$ 2,615	$ 2,840
Reinsurers' share of claims and benefits	(224)	(53)
Net claims	$ 2,391	$ 2,787

Insurance claims and policy benefit liabilities

All actuarial assumptions are set in conjunction with Canadian Institute of Actuaries Standards of Practice and OSFI requirements. The assumptions that have the greatest effect on the measurement of insurance liabilities, the processes used to determine them and the assumptions used as at October 31, 2018 are as follows:

Life insurance

Mortality and morbidity – Mortality estimates are based on standard industry insured mortality tables, adjusted where appropriate to reflect our own experience. Morbidity assumptions are made with respect to the rates of claim incidence and claim termination for health insurance policies and are based on a combination of industry and our own experience.

Future investment yield – Assumptions are based on the current yield rate, a reinvestment assumption and an allowance for future credit losses for each line of business, and are developed using interest rate scenario testing, including prescribed scenarios for determination of minimum liabilities as set out in the actuarial standards.

Policyholder behaviour – Under certain policies, the policyholder has a contractual right to change benefits and premiums, as well as convert policies to permanent forms of insurance. All policyholders have the right to terminate their policies through lapse. Lapses represent the termination of policies due to non-payment of premiums. Lapse assumptions are primarily based on our recent experience adjusted for emerging industry experience where applicable.

Significant insurance assumptions

	As at	
	October 31 2018	October 31 2017
Life Insurance		
Canadian Insurance		
Mortality rates (1)	0.11%	0.11%
Morbidity rates (2)	1.82	1.74
Reinvestment yield (3)	3.80	3.90
Lapse rates (4)	0.50	0.50
International Insurance		
Mortality rates (1)	0.52	0.47
Reinvestment yield (3)	3.14	3.14

(1) Average annual death rate for the largest portfolio of insured policies.
(2) Average net settlement rate for the individual and group disability insurance portfolio.
(3) Ultimate reinvestment rate of the insurance operations.
(4) Ultimate policy termination rate (lapse rate) for the largest permanent life insurance portfolio that relies on higher termination rate to maintain its profitability (lapse-supported policies).

Insurance claims and policy benefit liabilities

The following table summarizes our gross and reinsurers' share of insurance liabilities at the end of the year.

	As at					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars)	Gross	Ceded	Net	Gross	Ceded	Net
Life insurance policyholder liabilities						
Life, health and annuity	$ 9,982	$ 493	$ 9,489	$ 9,653	$ 393	$ 9,260
Investment contracts (1)	42	–	42	34	–	34
	$ 10,024	$ 493	$ 9,531	$ 9,687	$ 393	$ 9,294
Non-life insurance policyholder liabilities						
Unearned premium provision (1)	$ 26	$ –	$ 26	$ 23	$ –	$ 23
Unpaid claims provision	18	3	15	23	2	21
	$ 44	$ 3	$ 41	$ 46	$ 2	$ 44
	$ 10,068	$ 496	$ 9,572	$ 9,733	$ 395	$ 9,338

(1) Insurance liabilities for investment contracts and unearned premium provision are reported in Other liabilities on the Consolidated Balance Sheets.

Reconciliation of life insurance policyholder liabilities

	For the year ended					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars)	Gross	Ceded	Net	Gross	Ceded	Net
Balances at beginning of period	$ 9,687	$ 393	$ 9,294	$ 9,159	$ 545	$ 8,614
New and in-force policies	502	83	419	865	53	812
Changes in assumption and methodology	(173)	17	(190)	(349)	(205)	(144)
Net change in investment contracts	8	–	8	12	–	12
Balances at end of period	$ 10,024	$ 493	$ 9,531	$ 9,687	$ 393	$ 9,294

The net increase in Insurance claims and policy benefit liabilities over the prior year was comprised of the net increase in life and health liabilities and reinsurance attributable to business growth partially offset by market movements on assets backing life and health liabilities. During the year, we reviewed all key actuarial methods and assumptions which are used in determining the policy benefit liabilities resulting in a $190 million net decrease to insurance liabilities comprised of: (i) a decrease of $90 million for revised actuarial reserves on interest rate risk; (ii) a decrease of $84 million due to reinsurance contract renegotiations; (iii) decrease of $11 million arising from insurance risk related assumption updates largely due to mortality, morbidity, maintenance, property and casualty margin for adverse deviation and expense assumptions, impacting both gross and ceded insurance policyholder liabilities; and (iv) a decrease of $5 million due to valuation system and data changes.

Reconciliation of non-life insurance policyholder liabilities

	For the year ended					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars)	Gross	Ceded	Net	Gross	Ceded	Net
Balances at beginning of period	$ 46	$ 2	$ 44	$ 50	$ 4	$ 46
Changes in unearned premiums provision						
Written premiums	126	1	125	119	1	118
Less: Net premiums earned	(123)	–	(123)	(119)	(1)	(118)
Changes in unpaid claims provision and adjustment expenses						
Incurred claims	75	–	75	64	(2)	66
Less: Claims paid	(80)	–	(80)	(68)	–	(68)
Balances at end of period	$ 44	$ 3	$ 41	$ 46	$ 2	$ 44

Sensitivity analysis

The following table presents the sensitivity of the level of insurance policyholder liabilities disclosed in this note to reasonably possible changes in the actuarial assumptions used to calculate them. The percentage change in each variable is applied to a range of existing actuarial modelling assumptions to derive the possible impact on net income. The analyses are performed where a single assumption is changed while holding other assumptions constant, which is unlikely to occur in practice.

		Net income impact for year ended	
(Millions of Canadian dollars, except for percentage amounts)	Change in variable	**October 31 2018**	October 31 2017
Increase in market interest rates (1)	1%	**$ (2)**	$ (1)
Decrease in market interest rates (1)	1	**–**	3
Increase in equity market values (2)	10	**6**	3
Decrease in equity market values (2)	10	**(8)**	(4)
Increase in maintenance expenses (3)	5	**(29)**	(29)
Life Insurance (3)			
Adverse change in annuitant mortality rates	2	**(131)**	(117)
Adverse change in assurance mortality rates	2	**(59)**	(60)
Adverse change in morbidity rates	5	**(188)**	(183)
Adverse change in lapse rates	10	**(226)**	(220)

(1) Sensitivities for market interest rates include the expected current period earnings impact of a 100 basis points shift in the yield curve by increasing the current reinvestment rates while holding the assumed ultimate rates constant. The sensitivity consists of both the impact on assumed reinvestment rates in the actuarial liabilities and any changes in fair value of assets and liabilities from the yield curve shift.

(2) Sensitivities to changes in equity market values are composed of the expected current period earnings impact from differences in the changes in fair value of the equity asset holdings and the partially offsetting impact on the actuarial liabilities.

(3) Sensitivities to changes in maintenance expenses and life insurance actuarial assumptions include the expected current period earnings impact from recognition of increased liabilities due to an adverse change in the given assumption over the lifetime of all inforce policies.

Note 15 Segregated funds

We offer certain individual variable insurance contracts that allow policyholders to invest in segregated funds. The investment returns on these funds are passed directly to the policyholders. Amounts invested are at the policyholders' risk, except where the policyholders have selected options providing maturity and death benefit guarantees. A liability for the guarantees is recorded in Insurance claims and policy benefit liabilities.

Segregated funds net assets are recorded at fair value. All of our segregated funds net assets are categorized as Level 1 in the fair value hierarchy. The fair value of the segregated funds liabilities is equal to the fair value of the segregated funds net assets. Segregated funds net assets and segregated funds liabilities are presented on separate lines on the Consolidated Balance Sheets. The following tables present the composition of net assets and the changes in net assets for the year.

Segregated funds net assets

	As at	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Cash	**$ 19**	$ 1
Investment in mutual funds	**1,348**	1,217
Other assets (liabilities) net	**1**	(2)
	$ 1,368	$ 1,216

Changes in net assets

	For the year ended	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Net assets at beginning of period	**$ 1,216**	$ 981
Additions (deductions):		
Deposits from policyholders	**537**	430
Net realized and unrealized gains (losses)	**(40)**	87
Interest and dividends	**31**	26
Payment to policyholders	**(342)**	(279)
Management and administrative fees	**(34)**	(29)
Net assets at end of period	**$ 1,368**	$ 1,216

Plan characteristics

We sponsor a number of programs that provide pension and post-employment benefits to eligible employees. The majority of beneficiaries of the pension plans are located in Canada and other beneficiaries of the pension plans are primarily located in the U.S., the U.K. and the Caribbean. The pension arrangements including investment, plan benefits and funding decisions are governed by local pension committees or trustees, who are legally segregated from the Bank, or management. Significant plan changes require the approval of the Board of Directors.

Our defined benefit pension plans provide pension benefits based on years of service, contributions and average earnings at retirement. Our primary defined benefit pension plans are closed to new members. New employees are generally eligible to join defined contribution pension plans. The specific features of these plans vary by location. We also provide supplemental non-registered (non-qualified) pension plans for certain executives and senior management that are typically unfunded or partially funded.

Our defined contribution pension plans provide pension benefits based on accumulated employee and Bank contributions. The Bank contributions are based on a percentage of an employee's annual earnings and a portion of the Bank contribution may be dependent on the amount being contributed by the employee and their years of service.

Our primary other post-employment benefit plans provide health, dental, disability and life insurance coverage and cover a number of current and retired employees who are mainly located in Canada. These plans are unfunded unless required by legislation.

We measure our benefit obligations and pension assets as at October 31 each year. All plans are valued using the projected unit-credit method. We fund our registered defined benefit pension plans in accordance with actuarially determined amounts required to satisfy employee benefit obligations under current pension regulations. For our principal pension plan, the most recent funding actuarial valuation was completed on January 1, 2018, and the next valuation will be completed on January 1, 2019.

For the year ended October 31, 2018, total contributions to our pension plans (defined benefit and defined contribution plans) and other post-employment benefit plans were $594 million and $65 million (October 31, 2017 – $612 million and $62 million), respectively. For 2019, total contributions to our pension plans and other post-employment benefit plans are expected to be $578 million and $78 million, respectively.

Risks

By their design, the defined benefit pension and other post-employment benefit plans expose the Bank to various risks such as investment performance, reductions in discount rates used to value the obligations, increased longevity of plan members, future inflation levels impacting future salary increases as well as future increases in healthcare costs. These risks will reduce over time due to the membership closure of our primary defined benefit pension plans and migration to defined contribution pension plans.

The following table presents the financial position related to all of our material pension and other post-employment benefit plans worldwide, including executive retirement arrangements.

	As at			
	October 31, 2018		October 31, 2017	
(Millions of Canadian dollars)	**Defined benefit pension plans**	**Other post-employment benefit plans**	Defined benefit pension plans	Other post-employment benefit plans
Canada				
Fair value of plan assets	$ 12,587	$ 1	$ 12,505	$ 1
Present value of defined benefit obligation	12,270	1,522	12,834	1,714
Net surplus (deficit)	$ 317	$ (1,521)	$ (329)	$ (1,713)
International				
Fair value of plan assets	$ 977	$ –	$ 1,068	$ –
Present value of defined benefit obligation	948	100	1,171	131
Net surplus (deficit)	$ 29	$ (100)	$ (103)	$ (131)
Total				
Fair value of plan assets	$ 13,564	$ 1	$ 13,573	$ 1
Present value of defined benefit obligation	13,218	1,622	14,005	1,845
Total net surplus (deficit)	$ 346	$ (1,621)	$ (432)	$ (1,844)
Effect of asset ceiling	(1)	–	(1)	–
Total net surplus (deficit), net of effect of asset ceiling	$ 345	$ (1,621)	$ (433)	$ (1,844)
Amounts recognized in our Consolidated Balance Sheets				
Employee benefit assets	$ 626	$ –	$ 59	$ –
Employee benefit liabilities	(281)	(1,621)	(492)	(1,844)
Total net surplus (deficit), net of effect of asset ceiling	$ 345	$ (1,621)	$ (433)	$ (1,844)

The following table presents an analysis of the movement in the financial position related to all of our material pension and other post-employment benefit plans worldwide, including executive retirement arrangements.

	As at or for the year ended			
	October 31, 2018		October 31, 2017	
(Millions of Canadian dollars)	**Defined benefit pension plans** (1)	**Other post-employment benefit plans**	Defined benefit pension plans (1)	Other post-employment benefit plans
Opening Fair value of plan assets at beginning of period	**$ 13,573**	**$ 1**	$ 12,459	$ 1
Interest income	**476**	**–**	426	–
Remeasurements				
Return on plan assets (excluding interest income)	**(268)**	**–**	749	1
Change in foreign currency exchange rate	**(10)**	**–**	25	–
Contributions – Employer	**409**	**65**	444	62
Contributions – Plan participant	**49**	**19**	50	19
Payments	**(586)**	**(84)**	(566)	(82)
Payments – amount paid in respect of any settlements	**(64)**	**–**	–	–
Other	**(15)**	**–**	(14)	–
Closing Fair value of plan assets at end of period	**$ 13,564**	**$ 1**	$ 13,573	$ 1
Opening Benefit obligation at beginning of period	**$ 14,005**	**$ 1,845**	$ 13,879	$ 1,894
Current service costs	**359**	**34**	380	40
Past service costs	**(13)**	**(25)**	(2)	–
Gains and losses on settlements	**13**	**–**	–	–
Interest expense	**484**	**66**	468	68
Remeasurements				
Actuarial losses (gains) from demographic assumptions	**(164)**	**(66)**	(2)	(36)
Actuarial losses (gains) from financial assumptions	**(828)**	**(140)**	(188)	3
Actuarial losses (gains) from experience adjustments	**(22)**	**(32)**	(31)	(59)
Change in foreign currency exchange rate	**(15)**	**5**	18	(2)
Contributions – Plan participant	**49**	**19**	50	19
Payments	**(586)**	**(84)**	(566)	(82)
Payments – amount paid in respect of any settlements	**(64)**	**–**	–	–
Other	**–**	**–**	(1)	–
Closing Benefit obligation at end of period	**$ 13,218**	**$ 1,622**	$ 14,005	$ 1,845
Unfunded obligation	**$ 27**	**$ 1,481**	$ 30	$ 1,694
Wholly or partly funded obligation	**13,191**	**141**	13,975	151
Total benefit obligation	**$ 13,218**	**$ 1,622**	$ 14,005	$ 1,845

(1) For pension plans with funding deficits, the benefit obligations and fair value of plan assets as at October 31, 2018 were $685 million and $404 million, respectively (October 31, 2017 – $12,824 million and $12,332 million, respectively).

Pension and other post-employment benefit expense

The following table presents the composition of our pension and other post-employment benefit expense related to our material pension and other post-employment benefit plans worldwide.

	For the year ended			
	Pension plans		Other post-employment benefit plans	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017	**October 31 2018**	October 31 2017
Current service costs	**$ 359**	$ 380	**$ 34**	$ 40
Past service costs	**(13)**	(2)	**(25)**	–
Gains and losses on settlements	**13**	–	**–**	–
Net interest expense	**8**	42	**66**	68
Remeasurements of other long term benefits	**–**	–	**(4)**	(2)
Administrative expense	**15**	14	**–**	–
Defined benefit pension expense	**$ 382**	$ 434	**$ 71**	$ 106
Defined contribution pension expense	**185**	168	**–**	–
	$ 567	$ 602	**$ 71**	$ 106

Service costs for the year ended October 31, 2018 totalled $354 million (October 31, 2017 – $370 million) for pension plans in Canada and $(8) million (October 31, 2017 – $8 million) for International plans. Net interest expense (income) for the year ended October 31, 2018 totalled $4 million (October 31, 2017 – $37 million) for pension plans in Canada and $4 million (October 31, 2017 – $5 million) for International plans.

Pension and other post-employment benefit remeasurements

The following table presents the composition of our remeasurements recorded in OCI related to our material pension and other post-employment benefit plans worldwide.

	For the year ended			
	Defined benefit pension plans		Other post-employment benefit plans	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017	**October 31 2018**	October 31 2017
Actuarial (gains) losses:				
Changes in demographic assumptions	**$ (164)**	$ (2)	**$ (65)**	$ (34)
Changes in financial assumptions	**(828)**	(188)	**(134)**	6
Experience adjustments	**(22)**	(31)	**(35)**	(62)
Return on plan assets (excluding interest based on discount rate)	**268**	(749)	**–**	(1)
Change in asset ceiling (excluding interest income)	**–**	(2)	**–**	–
	$ (746)	$ (972)	**$ (234)**	$ (91)

Remeasurements recorded in OCI for the year ended October 31, 2018 were gains of $633 million (October 31, 2017 – gains of $963 million) for pension plans in Canada and gains of $113 million (October 31, 2017 – gains of $9 million) for International plans.

Investment policy and strategies

Defined benefit pension plan assets are invested prudently in order to meet our longer-term pension obligations. The pension plans' investment strategy is to hold a diversified mix of investments by asset class and geographic location in order to reduce investment-specific risk to the funded status while maximizing the expected returns to meet pension obligations. Investment of the plans' assets is conducted with careful consideration of the pension obligation's sensitivity to interest rates and credit spreads which are key risk factors impacting the obligation's value. The asset mix policy is therefore consistent with an asset/liability framework. Factors taken into consideration in developing our asset mix include but are not limited to the following:

(i) the nature of the underlying benefit obligations, including the duration and term profile of the liabilities;
(ii) the member demographics, including expectations for normal retirements, terminations, and deaths;
(iii) the financial position of the pension plans;
(iv) the diversification benefits obtained by the inclusion of multiple asset classes; and
(v) expected asset returns, including asset and liability volatility and correlations.

To implement our asset mix policy, we may invest in debt securities, equity securities, alternative investments and derivative instruments. Our holdings in certain investments, including common shares, debt securities rated lower than BBB and residential and commercial mortgages, cannot exceed a defined percentage of the market value of our defined benefit pension plan assets. We may use derivative instruments as either a synthetic investment to more efficiently replicate the performance of an underlying security, or as a hedge against financial risks within the plans. To manage our credit risk exposure, where derivatives instruments are not centrally cleared, counterparties are required to meet minimum credit ratings and enter into collateral agreements.

Our defined benefit pension plan assets are primarily comprised of debt and equity securities and alternative investments. Our equity securities generally have unadjusted quoted market prices in an active market (Level 1) and our debt securities generally have quoted market prices for similar assets in an active market (Level 2). Alternative investments and other includes cash, hedge funds, and private fund investments including infrastructure, real estate leases, private equity and debt. In the case of private fund investments, no quoted market prices are usually available (Level 2 or Level 3). These fund assets are either valued by an independent valuator or priced using observable market inputs.

During the year ended October 31, 2018, management of defined benefit pension investment focused on opportunistically investing in funds which increased diversification, reduced pension plan risk and improved expected return. Over time, an increasing allocation to debt securities is being used to reduce asset/liability duration mismatch and hence variability of the plans' funded status due to interest rate movement. Longer maturity debt securities, given their price sensitivity to movements in interest rates, are considered to be a good economic hedge to risk associated with the plans' liabilities, which are discounted using predominantly long maturity bond interest rates as inputs.

Asset allocation of defined benefit pension plans (1)

	As at					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars, except percentages)	**Fair value**	**Percentage of total plan assets**	**Quoted in active market (2)**	Fair value	Percentage of total plan assets	Quoted in active market (2)
Equity securities						
Domestic	**$ 1,259**	**10%**	**100%**	$ 1,752	13%	100%
Foreign	**3,243**	**24**	**99**	3,314	25	100
Debt securities						
Domestic government bonds	**2,643**	**19**	**–**	2,502	18	–
Foreign government bonds	**288**	**2**	**–**	387	3	–
Corporate and other bonds	**3,265**	**24**	**–**	2,896	21	–
Alternative investments and other	**2,866**	**21**	**15**	2,722	20	16
	$ 13,564	**100%**	**36%**	$ 13,573	100%	41%

(1) The asset allocation is based on the underlying investments held directly and indirectly through the funds as this is how we manage our investment policy and strategies.
(2) If our assessment of whether or not an asset was quoted in an active market was based on direct investments, 40% of our total plan assets would be classified as quoted in an active market (October 31, 2017 – 45%).

The allocation of equity securities in our pension plans in Canada is 33% (October 31, 2017 – 38%) and that of our International plans is 23% (October 31, 2017 – 22%). The allocation of debt securities in our pension plans in Canada is 46% (October 31, 2017 – 42%) and that of our International plans is 42% (October 31, 2017 – 42%). The allocation of alternative investments and other in our pension plans in Canada is 21% (October 31, 2017 – 20%) and that of our International plans is 35% (October 31, 2017 – 36%).

As at October 31, 2018, the plan assets include 1 million (October 31, 2017 – 1 million) of our common shares with a fair value of $95 million (October 31, 2017 – $121 million) and $49 million (October 31, 2017 – $41 million) of our debt securities. For the year ended October 31, 2018, dividends received on our common shares held in the plan assets were $4 million (October 31, 2017 – $4 million).

Maturity profile

The following table presents the maturity profile of our defined benefit pension plan obligation.

	As at October 31, 2018		
(Millions of Canadian dollars, except participants and years)	Canada	International	Total
Number of plan participants	70,096	7,687	77,783
Actual benefit payments 2018	$ 521	$ 65	$ 586
Benefits expected to be paid 2019	575	57	632
Benefits expected to be paid 2020	594	59	653
Benefits expected to be paid 2021	615	61	676
Benefits expected to be paid 2022	636	61	697
Benefits expected to be paid 2023	657	61	718
Benefits expected to be paid 2024-2028	3,567	297	3,864
Weighted average duration of defined benefit payments	14.9 years	17.9 years	15.1 years

Significant assumptions

Our methodologies to determine significant assumptions used in calculating the defined benefit pension and other post-employment benefit expense are as follows:

Discount rate

For the Canadian pension and other post-employment benefit plans, all future expected benefit payments at each measurement date are discounted at spot rates from a derived Canadian AA corporate bond yield curve. The derived curve is based on actual short and mid-maturity corporate AA rates and extrapolated longer term rates. The extrapolated corporate AA rates are derived from observed corporate A, corporate AA and provincial AA yields. For the International pension and other post-employment benefit plans, all future expected benefit payments at each measurement date are discounted at spot rates from a local AA corporate bond yield curve. Spot rates beyond 30 years are set to equal the 30-year spot rate. The discount rate is the equivalent single rate that produces the same discounted value as that determined using the entire discount curve. This valuation methodology does not rely on assumptions regarding reinvestment returns.

Rate of increase in future compensation

The assumptions for increases in future compensation are developed separately for each plan, where relevant. Each assumption is set based on the price inflation assumption and compensation policies in each market, as well as relevant local statutory and plan-specific requirements.

Healthcare cost trend rates

Healthcare cost calculations are based on both short and long term trend assumptions established using the plan's recent experience as well as market expectations.

Weighted average assumptions to determine benefit obligation

	As at			
	Defined benefit pension plans		Other post-employment benefit plans	
	October 31 2018	October 31 2017	October 31 2018	October 31 2017
Discount rate	4.00%	3.50%	4.10%	3.70%
Rate of increase in future compensation	3.30%	3.30%	n.a.	n.a.
Healthcare cost trend rates (1)				
– Medical	n.a.	n.a.	3.50%	4.00%
– Dental	n.a.	n.a.	3.10%	3.90%

(1) For our other post-employment benefit plans, the assumed trend rates used to measure the expected benefit costs of the defined benefit obligations are also the ultimate trend rates.
n.a. not applicable

Mortality assumptions

Mortality assumptions are significant in measuring our obligations under the defined benefit pension plans. These assumptions have been set based on country specific statistics. Future longevity improvements have been considered and included where appropriate. The following table summarizes the mortality assumptions used for material plans.

	As at							
	October 31, 2018				October 31, 2017			
	Life expectancy at 65 for a member currently at				Life expectancy at 65 for a member currently at			
	Age 65		**Age 45**		Age 65		Age 45	
(In years)	**Male**	**Female**	**Male**	**Female**	Male	Female	Male	Female
Country								
Canada	**23.7**	**24.1**	**24.7**	**25.0**	23.2	23.7	24.2	24.6
United States	**20.6**	**22.7**	**22.3**	**24.2**	20.7	22.7	22.3	24.2
United Kingdom	**23.4**	**25.2**	**25.0**	**26.9**	24.1	26.2	26.2	28.4

Sensitivity analysis

Assumptions adopted can have a significant effect on the obligations for defined benefit pension and other post-employment benefit plans. The increase (decrease) in obligation in the following table has been determined assuming all other assumptions are held constant. In practice, this is unlikely to occur, as changes in some of the assumptions may be correlated. The following table presents the sensitivity analysis of key assumptions for 2018.

	Increase (decrease) in obligation	
(Millions of Canadian dollars)	**Defined benefit pension plans**	**Other post-employment benefit plans**
Discount rate		
Impact of 50bps increase in discount rate	**$ (946)**	**$ (107)**
Impact of 50bps decrease in discount rate	**1,060**	**120**
Rate of increase in future compensation		
Impact of 50bps increase in rate of increase in future compensation	**59**	**1**
Impact of 50bps decrease in rate of increase in future compensation	**(62)**	**(1)**
Mortality rate		
Impact of an increase in longevity by one additional year	**331**	**29**
Healthcare cost trend rate		
Impact of 100bps increase in healthcare cost trend rate	**n.a.**	**79**
Impact of 100bps decrease in healthcare cost trend rate	**n.a.**	**(66)**

n.a. not applicable

Note 17 Other liabilities

	As at	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Cash collateral	**$ 13,907**	$ 15,422
Accounts payable and accrued expenses	**1,531**	1,293
Payroll and related compensation	**7,073**	7,192
Payable to brokers, dealers and clients	**4,078**	2,932
Negotiable instruments	**1,693**	2,080
Accrued interest payable	**2,223**	1,781
Deferred income	**2,259**	2,079
Taxes payable	**2,071**	2,342
Precious metals certificates	**346**	387
Dividends payable	**1,482**	1,394
Insurance related liabilities	**364**	334
Deferred income taxes	**84**	97
Provisions	**507**	460
Employee benefit liabilities	**1,902**	2,336
Other	**12,753**	6,826
	$ 52,273	$ 46,955

Note 18 Subordinated debentures

The debentures are unsecured obligations and are subordinated in right of payment to the claims of depositors and certain other creditors. The amounts presented below are net of our own holdings in these debentures, and include the impact of fair value hedges used for managing interest rate risk.

(Millions of Canadian dollars, except percentage and foreign currency)				As at	
Maturity	Earliest par value redemption date	Interest rate	Denominated foreign currency (millions)	**October 31 2018**	October 31 2017
August 12, 2019		9.00%	US$75	**$ 103**	$ 106
July 15, 2022		5.38%	US$150	**208**	207
June 8, 2023		9.30%		**110**	110
July 17, 2024 (1)	July 17, 2019	3.04% (2)		**998**	1,002
December 6, 2024	December 6, 2019	2.99% (3)		**1,978**	2,003
June 4, 2025 (1)	June 4, 2020	2.48% (3)		**988**	992
January 20, 2026 (1)	January 20, 2021	3.31% (4)		**1,443**	1,456
January 27, 2026 (1)		4.65%	US$1,500	**1,813**	1,882
September 29, 2026 (1)	September 29, 2021	3.45% (5)		**988**	1,014
November 1, 2027	November 1, 2022	4.75%	TT$300	**59**	57
June 26, 2037	June 26, 2017 (6)	2.86%	JPY 10,000	**–**	–
October 1, 2083	Any interest payment date	(7)		**224**	224
June 29, 2085	Any interest payment date	(8)	US$174	**229**	224
				$ 9,141	$ 9,277
Deferred financing costs				**(10)**	(12)
				$ 9,131	$ 9,265

The terms and conditions of the debentures are as follows:

(1) The notes include non-viability contingency capital (NVCC) provisions, necessary for the notes to qualify as Tier 2 regulatory capital under Basel III. NVCC provisions require the conversion of the instrument into a variable number of common shares in the event that OSFI deems the Bank non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. In such an event, each note is convertible into common shares pursuant to an automatic conversion formula with a multiplier of 1.5 and a conversion price based on the greater of: (i) a floor price of $5.00 and (ii) the current market price of our common shares based on the volume weighted average trading price of our common shares on the Toronto Stock Exchange. The number of shares issued is determined by dividing the par value of the note (including accrued and unpaid interest on such note) by the conversion price and then times the multiplier.

(2) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.08% above the 90-day Bankers' Acceptance rate.

(3) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.10% above the 90-day Bankers' Acceptance rate.

(4) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 2.35% above the 90-day Bankers' Acceptance rate.

(5) Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.12% above the 90-day Bankers' Acceptance rate.

(6) All ¥10,000 million outstanding subordinated debentures were redeemed on June 26, 2017 for 100% of their principal amount plus accrued interest to the redemption date.

(7) Interest at a rate of 40 basis points above the 30-day Bankers' Acceptance rate.

(8) Interest at a rate of 25 basis points above the U.S. dollar 3-month London Interbank Mean Rate (LIMEAN). In the event of a reduction of the annual dividend we declare on our common shares, the interest payable on the debentures is reduced pro rata to the dividend reduction and the interest reduction is payable with the proceeds from the sale of newly issued common shares.

All redemptions, cancellations and exchanges of subordinated debentures are subject to the consent and approval of OSFI, except for the debentures maturing August 12, 2019 and July 15, 2022.

Maturity schedule

The aggregate maturities of subordinated debentures, based on the maturity dates under the terms of issue, are as follows:

(Millions of Canadian dollars)	**October 31 2018**
Within 1 year	**$ 103**
1 to 5 years	**318**
5 to 10 years	**8,267**
Thereafter	**453**
	$ 9,141

Note 19 Trust capital securities

We issued innovative capital instruments, RBC Trust Capital Securities (RBC TruCS), through the structured entity RBC Capital Trust (Trust).

On June 30, 2018, the Trust redeemed all issued and outstanding RBC TruCS 2008-1 for cash at a redemption price of $1,000 per unit.

Note 20 Equity

Share capital

Authorized share capital

Preferred – An unlimited number of First Preferred Shares and Second Preferred Shares without nominal or par value, issuable in series; the aggregate consideration for which all the First Preferred Shares and all the Second Preferred Shares that may be issued may not exceed $20 billion and $5 billion, respectively.

Common – An unlimited number of shares without nominal or par value may be issued.

Outstanding share capital

The following table details our common and preferred shares outstanding.

	As at and for the year ended					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars, except the number of shares and dividends per share)	Number of shares (thousands)	Amount	Dividends declared per share	Number of shares (thousands)	Amount	Dividends declared per share
Common shares issued						
Balance at beginning of period	1,452,898	$ 17,730		1,485,394	$ 17,939	
Issued in connection with share-based compensation plans (1)	1,466	92		3,477	227	
Purchased for cancellation (2)	(15,335)	(187)		(35,973)	(436)	
Balance at end of period	1,439,029	$ 17,635	$ 3.77	1,452,898	$ 17,730	$ 3.48
Treasury shares – common shares						
Balance at beginning of period	(363)	$ (27)		(1,159)	$ (80)	
Purchases	(53,964)	(5,470)		(46,066)	(4,361)	
Sales	54,092	5,479		46,862	4,414	
Balance at end of period	(235)	$ (18)		(363)	$ (27)	
Common shares outstanding	1,438,794	$ 17,617		1,452,535	$ 17,703	
Preferred shares issued						
First preferred (3)						
Non-cumulative, fixed rate						
Series W	12,000	$ 300	$ 1.23	12,000	$ 300	$ 1.23
Series AA	12,000	300	1.11	12,000	300	1.11
Series AB (4)	–	–	–	–	–	0.99
Series AC	8,000	200	1.15	8,000	200	1.15
Series AD (5)	10,000	250	1.13	10,000	250	1.13
Series AE	10,000	250	1.13	10,000	250	1.13
Series AF	8,000	200	1.11	8,000	200	1.11
Series AG	10,000	250	1.13	10,000	250	1.13
Series BH	6,000	150	1.23	6,000	150	1.23
Series BI	6,000	150	1.23	6,000	150	1.23
Series BJ	6,000	150	1.31	6,000	150	1.31
Series C-1 (6)	–	–	US$ –	82	107	US$ 55.00
Non-cumulative, 5-Year Rate Reset						
Series AJ	13,579	339	0.88	13,579	339	0.88
Series AL	12,000	300	1.07	12,000	300	1.07
Series AZ	20,000	500	1.00	20,000	500	1.00
Series BB	20,000	500	0.98	20,000	500	0.98
Series BD	24,000	600	0.90	24,000	600	0.90
Series BF	12,000	300	0.90	12,000	300	0.90
Series BK	29,000	725	1.38	29,000	725	1.38
Series BM	30,000	750	1.38	30,000	750	1.38
Non-cumulative, floating rate						
Series AK	2,421	61	0.78	2,421	61	0.62
Non-cumulative, fixed rate/floating rate						
Series C-2	20	31	US$ 67.50	20	31	US$ 67.50
	251,020	$ 6,306		251,102	$ 6,413	
Treasury shares – preferred shares						
Balance at beginning of period (7)	6	$ –		31	$ –	
Purchases	(10,215)	(256)		(5,311)	(130)	
Sales	10,323	259		5,286	130	
Balance at end of period (7)	114	$ 3		6	$ –	
Preferred shares outstanding	251,134	$ 6,309		251,108	$ 6,413	

(1) Includes fair value adjustments to stock options of $15 million (2017 – $46 million).

(2) During the year ended October 31, 2018, we purchased common shares for cancellation at an average cost of $99.29 per share with a book value of $12.22 per share. During the year ended October 31, 2017, we purchased common shares for cancellation at an average cost of $86.47 per share with a book value of $12.15 per share.

(3) First Preferred Shares were issued at $25 per share with the exception of Non-Cumulative Perpetual First Preferred Shares, Series C-1 (Series C-1) and Non-Cumulative Fixed Rate/Floating Rate First Preferred Shares, Series C-2 (Series C-2) which were issued at US$1,000 per share (equivalent to US$25 per depositary share).

(4) On September 27, 2017, we redeemed all 12 million issued and outstanding Non-Cumulative First Preferred Shares, Series AB, for cash at a redemption price of $25 per share.

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

(6) On November 13, 2017, we redeemed all 82,050 issued and outstanding Series C-1 shares for cash at a redemption price of US$1,000 per share (equivalent to US$25 per related depositary share).

(7) Positive amounts represent a short position in treasury shares.

Significant terms and conditions of preferred shares

As at October 31, 2018	Initial Period Annual Yield	Premium	Current Dividend per share (1)	Earliest redemption date (2)	Issue Date	Redemption price (2) (3)
Preferred shares						
First preferred						
Non-cumulative, fixed rate						
Series W (4)	4.90%		$ .306250	February 24, 2010	January 31, 2005	$ 25.00
Series AA	4.45%		.278125	May 24, 2011	April 4, 2006	25.00
Series AC	4.60%		.287500	November 24, 2011	November 1, 2006	25.00
Series AD (5)	4.50%		.281250	February 24, 2012	December 13, 2006	25.00
Series AE	4.50%		.281250	February 24, 2012	January 19, 2007	25.00
Series AF	4.45%		.278125	May 24, 2012	March 14, 2007	25.00
Series AG	4.50%		.281250	May 24, 2012	April 26, 2007	25.00
Series BH (6)	4.90%		.306250	November 24, 2020	June 5, 2015	26.00
Series BI (6)	4.90%		.306250	November 24, 2020	July 22, 2015	26.00
Series BJ (6)	5.25%		.328125	February 24, 2021	October 2, 2015	26.00
Non-cumulative, 5-Year Rate Reset (7)						
Series AJ	5.00%	1.93%	.220000	February 24, 2014	September 16, 2008	25.00
Series AL	5.60%	2.67%	.266250	February 24, 2014	November 3, 2008	25.00
Series AZ (6)	4.00%	2.21%	.250000	May 24, 2019	January 30, 2014	25.00
Series BB (6)	3.90%	2.26%	.243750	August 24, 2019	June 3, 2014	25.00
Series BD (6)	3.60%	2.74%	.225000	May 24, 2020	January 30, 2015	25.00
Series BF (6)	3.60%	2.62%	.225000	November 24, 2020	March 13, 2015	25.00
Series BK (6)	5.50%	4.53%	.343750	May 24, 2021	December 16, 2015	25.00
Series BM (6)	5.50%	4.80%	.343750	August 24, 2021	March 7, 2016	25.00
Non-cumulative, floating rate						
Series AK (8)		1.93%	.212482	February 24, 2019	February 24, 2014	25.00
Non-cumulative, fixed rate/floating rate						
Series C-2 (9)	6.75%	4.052%	US$ 16.875000	November 7, 2023	November 2, 2015	US$ 1,000.00

(1) Non-cumulative preferential dividends of each Series are payable quarterly, as and when declared by the Board of Directors, on or about the 24th day (7th day for Series C-2) of February, May, August and November.

(2) Subject to the consent of OSFI and the requirements of the *Bank Act* (Canada), we may, on or after the dates specified above, redeem First Preferred Shares. In the case of Series AJ, AL, AZ, BB, BD, BF, BK, BM and AK, these may be redeemed for cash at a price per share of $25 if redeemed on the earliest redemption date and on the same date every fifth year thereafter. In the case of Series W, AA, AC, AD, AE, AF, AG, BH, BI and BJ, these may be redeemed for cash at a price per share of $26 if redeemed during the 12 months commencing on the earliest redemption date and decreasing by $0.25 each 12-month period thereafter to a price per share of $25 if redeemed four years from the earliest redemption date or thereafter. Series C-2 may be redeemed at a price of US$1,000 on the earliest redemption date and any dividend payment date thereafter.

(3) Subject to the consent of OSFI and the requirements of the *Bank Act* (Canada), we may purchase the First Preferred Shares of each Series for cancellation at the lowest price or prices at which, in the opinion of the Board of Directors, such shares are obtainable.

(4) Subject to the approval of the Toronto Stock Exchange, we may, on or after February 24, 2010, convert First Preferred Shares Series W into our common shares. First Preferred Shares Series W may be converted into that number of common shares determined by dividing the current redemption price by the greater of $2.50 and 95% of the weighted average trading price of common shares at such time.

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

(6) The preferred shares include non-viability contingency capital (NVCC) provisions, necessary for the shares to qualify as Tier 1 regulatory capital under Basel III. NVCC provisions require the conversion of the instrument into a variable number of common shares in the event that OSFI deems the Bank non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. In such an event, each preferred share is convertible into common shares pursuant to an automatic conversion formula with a multiplier of 1 and with a conversion price based on the greater of: (i) a floor price of $5 and (ii) the current market price of our common shares based on the volume weighted average trading price of our common shares on the Toronto Stock Exchange. The number of shares issued is determined by dividing the preferred share value ($25 plus declared and unpaid dividends) by the conversion price.

(7) The dividend rate will reset on the earliest redemption date and every fifth year thereafter at a rate equal to the 5-year Government of Canada bond yield plus the premium indicated. The holders have the option to convert their shares into non-cumulative floating rate First Preferred Shares subject to certain conditions on the earliest redemption date and every fifth year thereafter at a rate equal to the three-month Government of Canada Treasury Bill rate plus the premium indicated.

(8) The dividend rate is equal to the three-month Government of Canada Treasury Bill rate plus the premium indicated. The holders have the option to convert their shares into non-cumulative First Preferred Shares, Series AJ subject to certain conditions on February 24, 2019 and every fifth year thereafter.

(9) The dividend rate will change on the earliest redemption date at a rate equal to the 3-month LIBOR plus the premium indicated. Series C-2 do not qualify as Tier 1 regulatory capital.

Restrictions on the payment of dividends

We are prohibited by the *Bank Act* (Canada) from declaring any dividends on our preferred or common shares when we are, or would be placed as a result of the declaration, in contravention of the capital adequacy and liquidity regulations or any regulatory directives issued under the Act. We may not pay dividends on our common shares at any time unless all dividends to which preferred shareholders are then entitled have been declared and paid or set apart for payment.

Currently, these limitations do not restrict the payment of dividends on our preferred or common shares.

Dividend reinvestment plan

Our dividend reinvestment plan (DRIP) provides common and preferred shareholders with a means to receive additional common shares rather than cash dividends. The plan is only open to shareholders residing in Canada or the United States. The requirements of our DRIP are satisfied through either open market share purchases or shares issued from treasury. During 2018 and 2017, the requirements of our DRIP were satisfied through open market share purchases.

Shares available for future issuances

As at October 31, 2018, 43.7 million common shares are available for future issue relating to our DRIP and potential exercise of stock options outstanding. In addition, we may issue up to 38.9 million common shares from treasury under the RBC Umbrella Savings and Securities Purchase Plan that was approved by shareholders on February 26, 2009.

Non-controlling interests

(Millions of Canadian dollars)	As at October 31 2018	As at October 31 2017
RBC Trust Capital Securities (1)		
Series 2008-1	$ –	$ 511
Other	94	88
	$ 94	$ 599

(1) As at October 31, 2018, we have redeemed all remaining outstanding RBC TruCS Series 2008-1.

Note 21 Share-based compensation

Stock option plans

We have stock option plans for certain key employees. Under the plans, options are periodically granted to purchase common shares. The exercise price for the majority of the grants is determined as the higher of the volume-weighted average of the trading prices per board lot (100 shares) of our common shares on the Toronto Stock Exchange (i) on the day preceding the day of grant; and (ii) the five consecutive trading days immediately preceding the day of grant. The exercise price for the remaining grants is the closing market share price of our common shares on the New York Stock Exchange on the date of grant. All options vest over a four-year period, and are exercisable for a period not exceeding 10 years from the grant date.

The compensation expense recorded for the year ended October 31, 2018, in respect of the stock option plans was $6 million (October 31, 2017 – $8 million). The compensation expense related to non-vested options was $3 million at October 31, 2018 (October 31, 2017 – $5 million), to be recognized over the weighted average period of 1.1 years (October 31, 2017 – 1.5 years).

Analysis of the movement in the number and weighted average exercise price of options is set out below:

A summary of our stock option activity and related information

(Canadian dollars per share except share amounts)	October 31, 2018 Number of options (thousands)	October 31, 2018 Weighted average exercise price (3)	October 31, 2017 Number of options (thousands)	October 31, 2017 Weighted average exercise price (3)
Outstanding at beginning of period	8,566	$ 64.96	10,650	$ 57.64
Granted	773	102.33	1,509	90.23
Exercised (1) (2)	(1,440)	50.42	(3,477)	51.14
Forfeited in the period	(129)	78.12	(116)	75.96
Outstanding at end of period	7,770	$ 71.40	8,566	$ 64.96
Exercisable at end of period	3,726	$ 55.82	4,337	$ 50.04

For the year ended.

(1) Cash received for options exercised during the year was $73 million (October 31, 2017 – $178 million) and the weighted average share price at the date of exercise was $101.81 (October 31, 2017 – $93.48).

(2) New shares were issued for all stock options exercised in 2018 and 2017.

(3) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rates as of October 31, 2018 and October 31, 2017. For foreign currency-denominated options exercised during the year, the weighted average exercise prices are translated using exchange rates as at the settlement date.

Options outstanding as at October 31, 2018 by range of exercise price

(Canadian dollars per share except share amounts and years)	Options outstanding: Number outstanding (thousands)	Options outstanding: Weighted average exercise price (1)	Options outstanding: Weighted average remaining contractual life (years)	Options exercisable: Number exercisable (thousands)	Options exercisable: Weighted average exercise price (1)
$19.79 – $46.55	1,065	$ 40.60	2.66	1,065	$ 40.60
$47.06 – $55.04	1,132	52.14	2.09	1,132	52.14
$58.65 – $74.22	1,003	64.55	5.04	937	63.94
$74.39 – $76.61	1,636	74.65	6.89	247	75.57
$78.59 – $102.33	2,934	90.53	7.83	345	78.59
	7,770	$ 71.40	5.72	3,726	$ 55.82

(1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rate as of October 31, 2018.

The weighted average fair value of options granted during the year ended October 31, 2018 was estimated at $6.66 (October 31, 2017 – $5.28). This was determined by applying the Black-Scholes model on the date of grant, taking into account the specific terms and conditions under which the options are granted, such as the vesting period and expected share price volatility estimated by considering both historic average share price volatility and implied volatility derived from traded options over our common shares of similar maturity to those of the employee options. The following assumptions were used to determine the fair value of options granted:

Weighted average assumptions

(Canadian dollars per share except percentages and years)	For the year ended October 31 2018	October 31 2017
Share price at grant date	$ 101.83	$ 90.30
Risk-free interest rate	1.71%	1.27%
Expected dividend yield	3.66%	4.14%
Expected share price volatility	13%	14%
Expected life of option	6 years	6 years

Employee savings and share ownership plans

We offer many employees an opportunity to own our common shares through savings and share ownership plans. Under these plans, the employees can generally contribute between 1% and 10% of their annual salary or benefit base for commission-based employees. For each contribution between 1% and 6%, we will match 50% of the employee contributions in our common shares. For the RBC Dominion Securities Savings Plan, our maximum annual contribution is $4,500 per employee. For the RBC U.K. Share Incentive Plan, our maximum annual contribution is £1,500 per employee. For the year ended October 31, 2018, we contributed $97 million (October 31, 2017 – $92 million), under the terms of these plans, towards the purchase of our common shares. As at October 31, 2018, an aggregate of 35 million common shares were held under these plans (October 31, 2017 – 36 million common shares).

Deferred share and other plans

We offer deferred share unit plans to executives, certain key employees and non-employee directors of RBC. Under these plans, participants may choose to receive all or a percentage of their annual variable short-term incentive bonus or directors' fee in the form of deferred share units (DSUs). The participants must elect to participate in the plan prior to the beginning of the year. DSUs earn dividend equivalents in the form of additional DSUs at the same rate as dividends on common shares. The participant is not allowed to convert the DSUs until retirement or termination of employment/directorship. The cash value of the DSUs is equivalent to the market value of common shares when conversion takes place.

We have a deferred bonus plan for certain key employees within Capital Markets. The deferred bonus is invested as RBC share units and a specified percentage vests on each of the three anniversary dates following the grant date. Each vested amount is paid in cash and is based on the original number of RBC share units plus accumulated dividends valued using the average closing price of RBC common shares during the five trading days immediately preceding the vesting date.

We offer performance deferred share award plans to certain key employees, all of which vest at the end of three years. Upon vesting, the award is paid in cash and is based on the original number of RBC share units granted plus accumulated dividends valued using the average closing price of RBC common shares during the five trading days immediately preceding the vesting date. A portion of the award under certain plans may be increased or decreased up to 25%, depending on our total shareholder return compared to a defined peer group of global financial institutions.

We maintain non-qualified deferred compensation plans for certain key employees in the United States. These plans allow eligible employees to defer a portion of their annual income and a variety of productivity and recruitment bonuses and allocate the deferrals among specified fund choices, including a RBC Share Accounted fund that tracks the value of our common shares.

The following table presents the units granted under the deferred share and other plans for the year.

Units granted under deferred share and other plans

	For the year ended			
	October 31, 2018		October 31, 2017	
(Units and per unit amounts)	Units granted (thousands)	Weighted average fair value per unit	Units granted (thousands)	Weighted average fair value per unit
Deferred share unit plans	376	$ 100.71	343	$ 91.87
Deferred bonus plan	4,820	95.18	4,347	100.30
Performance deferred share award plans	2,099	101.55	2,185	88.79
Deferred compensation plans	91	103.55	99	91.49
Other share-based plans	978	101.48	794	90.68
	8,364	$ 97.85	7,768	$ 93.24

Our liabilities for the awards granted under the deferred share and other plans are measured at fair value, determined based on the quoted market price of our common shares and specified fund choices as applicable. Annually, our obligation is increased by additional units earned by plan participants, and is reduced by forfeitures, cancellations, and the settlement of vested units. In addition, our obligation is impacted by fluctuations in the market price of our common shares and specified fund units. For performance deferred share award plans, the estimated outcome of meeting the performance conditions also impacts our obligation.

The following tables present the units that have been earned by the participants, our obligations for these earned units under the deferred share and other plans, and the related compensation expenses (recoveries) recognized for the year.

Obligations under deferred share and other plans

	As at			
	October 31, 2018		October 31, 2017	
(Millions of Canadian dollars except units)	Units (thousands)	Carrying amount	Units (thousands)	Carrying amount
Deferred share unit plans	4,631	$ 446	4,642	$ 468
Deferred bonus plan	10,347	990	12,021	1,213
Performance deferred share award plans	5,892	565	5,924	597
Deferred compensation plans (1)	3,299	317	3,651	368
Other share-based plans	2,140	202	2,021	201
	26,309	$ 2,520	28,259	$ 2,847

(1) Excludes obligations not determined based on the quoted market price of our common shares.

Compensation expenses recognized under deferred share and other plans

	For the year ended	
(Millions of Canadian dollars)	October 31 2018	October 31 2017
Deferred share unit plans	$ 6	$ 96
Deferred bonus plan	139	343
Performance deferred share award plans	190	312
Deferred compensation plans	80	342
Other share-based plans	78	108
	$ 493	$ 1,201

Note 22 Income taxes

Components of tax expense

	For the year ended	
(Millions of Canadian dollars)	October 31 2018	October 31 2017
Income taxes (recoveries) in Consolidated Statements of Income		
Current tax		
Tax expense for current year	$ 3,351	$ 3,261
Adjustments for prior years	(212)	(22)
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period	(11)	–
	3,128	3,239
Deferred tax		
Origination and reversal of temporary difference	28	(32)
Effects of changes in tax rates	148	(8)
Adjustments for prior years	152	5
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period	(127)	–
Write-down (reversal of a previous write-down)	–	(1)
	201	(36)
	3,329	3,203
Income taxes (recoveries) in Consolidated Statements of Comprehensive Income and Changes in Equity		
Other comprehensive income		
Net unrealized gains (losses) on available-for-sale securities		62
Reclassification of net losses (gains) on available-for-sale securities to income		(38)
Net unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income	12	
Provision for credit losses recognized in income	(5)	
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	(52)	
Unrealized foreign currency translation gains (losses)	2	(3)
Net foreign currency translation gains (losses) from hedging activities	(77)	142
Net gains (losses) on derivatives designated as cash flow hedges	84	195
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	8	(3)
Remeasurements of employee benefit plans	256	273
Net fair value change due to credit risk on financial liabilities designated as fair value through profit or loss	45	(124)
Net gains (losses) on equity securities designated at fair value through other comprehensive income	(5)	
Share-based compensation awards	15	(35)
	283	469
Total income taxes	$ 3,612	$ 3,672

Our effective tax rate changed from 21.8% for 2017 to 21.1% for 2018, principally due to higher net favourable tax adjustments, higher income from lower tax rate jurisdictions, and the net impact of the U.S. Tax Reform, as the writedown of net deferred taxes was more than offset by the lower corporate tax rate on U.S. earnings. These factors were partially offset by the impact of our share of the gain related to the sale of our U.S. operations of Moneris in the prior year.

The following is an analysis of the differences between the income tax expense reflected in the Consolidated Statements of Income and the amounts calculated at the Canadian statutory rate.

Reconciliation to statutory tax rate

	For the year ended			
(Millions of Canadian dollars, except for percentage amounts)	October 31, 2018		October 31, 2017	
Income taxes at Canadian statutory tax rate	$ 4,176	26.5%	$ 3,888	26.5%
Increase (decrease) in income taxes resulting from				
Lower average tax rate applicable to subsidiaries	(752)	(4.8)	(518)	(3.5)
Tax-exempt income from securities	(285)	(1.8)	(293)	(2.0)
Tax rate change	148	0.9	(8)	(0.1)
Other	42	0.3	134	0.9
Income taxes in Consolidated Statements of Income / effective tax rate	$ 3,329	21.1%	$ 3,203	21.8%

Deferred tax assets and liabilities result from tax loss and tax credit carryforwards and temporary differences between the tax basis of assets and liabilities and their carrying amounts on our Consolidated Balance Sheets.

Significant components of deferred tax assets and liabilities

	As at and for the year ended October 31, 2018				
(Millions of Canadian dollars)	Net asset beginning of period (1)	Change through equity	Change through profit or loss	Exchange rate differences	Net asset end of period
Net deferred tax asset/(liability)					
Allowance for credit losses	$ 703	$ (6)	$ 1	$ (3)	$ 695
Deferred compensation	1,491	(15)	(502)	59	1,033
Business realignment charges	11	–	(8)	–	3
Tax loss and tax credit carryforwards	19	–	188	(4)	203
Deferred income	(11)	–	(37)	–	(48)
Financial instruments measured at fair value through other comprehensive income	48	19	(74)	(1)	(8)
Premises and equipment and intangibles	(1,003)	(1)	182	(36)	(858)
Deferred expense	76	–	(23)	2	55
Pension and post-employment related	571	(260)	(16)	–	295
Other	(54)	3	88	(16)	21
	$ 1,851	$ (260)	$ (201)	$ 1	$ 1,391
Comprising					
Deferred tax assets	$ 1,948				$ 1,475
Deferred tax liabilities	(97)				(84)
	$ 1,851				$ 1,391

	As at and for the year ended October 31, 2017				
(Millions of Canadian dollars)	Net asset beginning of period	Change through equity	Change through profit or loss	Exchange rate differences	Net asset end of period
Net deferred tax asset/(liability)					
Allowance for credit losses	$ 484	$ –	$ 9	$ (7)	$ 486
Deferred compensation	1,558	35	(65)	(37)	1,491
Business realignment charges	8	–	3	–	11
Tax loss and tax credit carryforwards	32	–	(12)	(1)	19
Deferred income	95	–	(105)	(1)	(11)
Available-for-sale securities	10	47	(5)	(3)	49
Premises and equipment and intangibles	(1,081)	(1)	66	13	(1,003)
Deferred expense	(60)	–	135	1	76
Pension and post-employment related	825	(273)	23	(4)	571
Other	(33)	(12)	(13)	4	(54)
	$ 1,838	$ (204)	$ 36	$ (35)	$ 1,635
Comprising					
Deferred tax assets	$ 2,827				$ 1,732
Deferred tax liabilities	(989)				(97)
	$ 1,838				$ 1,635

(1) These amounts reflect certain transition adjustments made upon adoption of IFRS 9. Refer to Note 2 for further details.

The tax loss and tax credit carryforwards amount of deferred tax assets relates to losses and tax credits in our Canadian, U.S., Caribbean, and Japanese operations. Deferred tax assets of $203 million were recognized at October 31, 2018 (October 31, 2017 – $19 million) in respect of tax losses and tax credits incurred in current or preceding years for which recognition is dependent on the projection of future taxable profits. Management's forecasts support the assumption that it is probable that the results of future operations will generate sufficient taxable income to utilize the deferred tax assets. The forecasts rely on continued liquidity and capital support to our business operations, including tax planning strategies implemented in relation to such support.

As at October 31, 2018, unused tax losses, tax credits and deductible temporary differences of $443 million, $426 million and $39 million (October 31, 2017 – $387 million, $582 million and $40 million) available to be offset against potential tax adjustments or future taxable income were not recognized as deferred tax assets. This amount includes unused tax losses of $4 million which expire within one year (October 31, 2017 – $2 million), $2 million which expire in two to four years (October 31, 2017 – $4 million) and $437 million which expire after four years (October 31, 2017 – $381 million). There are no tax credits that will expire in one year (October 31, 2017 – $7 million), $45 million that will expire in two to four years (October 31, 2017 – $92 million) and $381 million that will expire after four years (October 31, 2017 – $483 million). In addition, there are deductible temporary differences of $1 million that will expire in one year (October 31, 2017 – $nil), $1 million that will expire in two to four years (October 31, 2017 – $1 million) and $37 million that will expire after four years (October 31, 2017 – $39 million).

The amount of temporary differences associated with investments in subsidiaries, branches and associates and interests in joint ventures for which deferred tax liabilities have not been recognized in the parent bank is $14.6 billion as at October 31, 2018 (October 31, 2017 – $13.5 billion).

Tax examinations and assessments

We have received proposal letters (the Proposals) from the Canada Revenue Agency (CRA), in respect of the 2013 and 2012 taxation years, which suggest that Royal Bank of Canada owes additional income taxes of approximately $211 million and $250 million, respectively, as the tax deductibility of certain dividends was denied on the basis that they were part of a "dividend rental arrangement". The Proposals are consistent with reassessments previously received for taxation years 2011, 2010, and 2009 for approximately $434 million of additional income taxes and interest in respect of the same matter. These amounts represent the maximum additional taxes owing for those years. It is possible that the CRA will reassess us for significant additional income tax for subsequent years on the same basis. We are confident that our tax filing position was appropriate and intend to defend ourselves vigorously.

U.S. Tax Reform

In December 2017, U.S. H.R. 1 was passed into law. The changes include a reduction in the corporate income tax rate from 35% to 21% which resulted in a write-down of $178 million (US$142 million), primarily related to net deferred tax assets. As the reduced tax rates were effective on January 1, 2018, the lower average tax rate applicable to subsidiaries includes the fiscal 2018 blended rate for U.S. subsidiaries. Please refer to the Legal and regulatory environment risk – United States Tax Reform section of the Management's Discussion and Analysis for further details.

Note 23 Earnings per share

	For the year ended	
(Millions of Canadian dollars, except share and per share amounts)	**October 31 2018**	October 31 2017
Basic earnings per share		
Net Income	**$ 12,431**	$ 11,469
Preferred share dividends	**(285)**	(300)
Net income attributable to non-controlling interest	**(31)**	(41)
Net income available to common shareholders	**12,115**	11,128
Weighted average number of common shares (in thousands)	**1,443,894**	1,466,988
Basic earnings per share (in dollars)	**$ 8.39**	$ 7.59
Diluted earnings per share		
Net income available to common shareholders	**$ 12,115**	$ 11,128
Dilutive impact of exchangeable shares	**15**	15
Net income available to common shareholders including dilutive impact of exchangeable shares	**12,130**	11,143
Weighted average number of common shares (in thousands)	**1,443,894**	1,466,988
Stock options (1)	**2,691**	3,273
Issuable under other share-based compensation plans	**742**	744
Exchangeable shares (2)	**3,158**	3,416
Average number of diluted common shares (in thousands)	**1,450,485**	1,474,421
Diluted earnings per share (in dollars)	**$ 8.36**	$ 7.56

(1) The dilutive effect of stock options was calculated using the treasury stock method. When the exercise price of options outstanding is greater than the average market price of our common shares, the options are excluded from the calculation of diluted earnings per share. For the year ended October 31, 2018, an average of 657,353 outstanding options with an average price of $102.33 were excluded from the calculation of diluted earnings per share. For the year ended October 31, 2017, no outstanding options were excluded from the calculation of diluted earnings per share.

(2) Includes exchangeable preferred shares.

Guarantees and commitments

We use guarantees and other off-balance sheet credit instruments to meet the financing needs of our clients.

The table below summarizes our maximum exposure to credit losses related to our guarantees and commitments provided to third parties. The maximum exposure to credit risk relating to a guarantee is the maximum risk of loss if there was a total default by the guaranteed parties, without consideration of possible recoveries under recourse provisions, insurance policies or from collateral held or pledged. The maximum exposure to credit risk relating to a commitment to extend credit is the full amount of the commitment. In both cases, the maximum risk exposure is significantly greater than the amount recognized as a liability in our Consolidated Balance Sheets.

	Maximum exposure to credit losses	
	As at	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017 (1)
Financial guarantees		
Financial standby letters of credit	**$ 15,502**	$ 16,295
Commitments to extend credit		
Backstop liquidity facilities	**36,267**	36,056
Credit enhancements	**2,128**	2,261
Documentary and commercial letters of credit	**268**	286
Other commitments to extend credit	**223,954**	185,286
Other credit-related commitments		
Securities lending indemnifications	**107,239**	101,844
Performance guarantees	**6,955**	6,579
Other	**391**	154

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

Our credit review process, our policy for requiring collateral security, and the types of collateral security held are generally the same for guarantees and commitments as for loans. Our clients generally have the right to request settlement of, or draw on, our guarantees and commitments within one year. However, certain guarantees can only be drawn if specified conditions are met. These conditions, along with collateral requirements, are described below. We believe that it is highly unlikely that all or substantially all of the guarantees and commitments will be drawn or settled within one year, and contracts may expire without being drawn or settled.

Financial guarantees

Financial standby letters of credit

Financial standby letters of credit represent irrevocable assurances that we will make payments in the event that a client cannot meet its payment obligations to the third party. For certain guarantees, the guaranteed party can request payment from us even though the client has not defaulted on its obligations. The term of these guarantees can range up to seven years.

Our policy for requiring collateral security with respect to these instruments and the types of collateral security held is generally the same as for loans. When collateral security is taken, it is determined on an account-by-account basis according to the risk of the borrower and the specifics of the transaction. Collateral security may include cash, securities and other assets pledged.

Commitments to extend credit

Backstop liquidity facilities

Backstop liquidity facilities are provided to ABCP conduit programs administered by us and third parties as an alternative source of financing in the event that such programs are unable to access commercial paper markets, or in limited circumstances, when predetermined performance measures of the financial assets owned by these programs are not met. The average remaining term of these liquidity facilities is approximately four years.

The terms of the backstop liquidity facilities do not require us to advance money to these programs in the event of bankruptcy or insolvency and generally do not require us to purchase non-performing or defaulted assets.

Credit enhancements

We provide partial credit enhancement to multi-seller ABCP programs administered by us to protect commercial paper investors in the event that the collections on the underlying assets together with the transaction-specific credit enhancements or the liquidity facilities prove to be insufficient to pay for maturing commercial paper. Each of the asset pools is structured to achieve a high investment-grade credit profile through credit enhancements from us and other third parties related to each transaction. The average remaining term of these credit facilities is approximately three years.

Documentary and commercial letters of credit

Documentary and commercial letters of credit, which are written undertakings by us on behalf of a client authorizing a third party to draw drafts on us up to a stipulated amount under specific terms and conditions, where some are collateralized based on the underlying agreement with the client and others are collateralized by cash deposits or other assets of the third party which may include the underlying shipment of goods to which they relate.

Other commitments to extend credit

Commitments to extend credit represent unused portions of authorizations to extend credit in the form of loans, bankers' acceptances or letters of credit where we do not have the ability to unilaterally withdraw the credit extended to the borrower.

Other credit-related commitments

Securities lending indemnifications

In securities lending transactions, we act as an agent for the owner of a security, who agrees to lend the security to a borrower for a fee, under the terms of a pre-arranged contract. The borrower must fully collateralize the security loaned at all times. As part of this custodial business, an indemnification may be provided to securities lending customers to ensure that the fair value of securities loaned will be returned in the event that the borrower fails to return the borrowed securities and the collateral held is insufficient to cover the fair value of those securities. These indemnifications normally terminate without being drawn upon. The term of these indemnifications varies, as the securities loaned are recallable on demand. Collateral held for our securities lending transactions typically includes cash, securities that are issued or guaranteed by the Canadian government, U.S. government or other OECD countries or high quality debt or equity instruments.

Performance guarantees

Performance guarantees represent irrevocable assurances that we will make payments to third-party beneficiaries in the event that a client fails to perform under a specified non-financial contractual obligation. Such obligations typically include works and service contracts, performance bonds, and warranties related to international trade. The term of these guarantees can range up to seven years.

Our policy for requiring collateral security with respect to these instruments and the types of collateral security held is generally the same as for loans. When collateral security is taken, it is determined on an account-by-account basis according to the risk of the borrower and the specifics of the transaction. Collateral security may include cash, securities and other assets pledged.

Indemnifications

In the normal course of our operations, we provide indemnifications which are often standard contractual terms to counterparties in transactions such as purchase and sale contracts, fiduciary, agency, licensing, custodial and service agreements, clearing system arrangements, participation as a member of exchanges, director/officer contracts and leasing transactions. These indemnification agreements may require us to compensate the counterparties for costs incurred as a result of changes in laws and regulations (including tax legislation) or as a result of litigation claims or statutory sanctions that may be suffered by the counterparty as a consequence of the transaction. The terms of these indemnification agreements vary based on the contract. The nature of the indemnification agreements prevents us from making a reasonable estimate of the maximum potential amount we could be required to pay to counterparties. Historically, we have not made any significant payments under such indemnifications.

Uncommitted amounts

Uncommitted amounts represent undrawn credit facilities for which we have the ability to unilaterally withdraw the credit extended to the borrower at any time. These include both retail and commercial commitments. As at October 31, 2018, the total balance of uncommitted amounts was $264 billion (October 31, 2017 – $245 billion[(1)]).

Other commitments

We act as underwriter for certain new issuances under which we alone or together with a syndicate of financial institutions purchase the new issue for resale to investors. In connection with these activities, our commitments were $141 million as at October 31, 2018, (October 31, 2017 – $38 million).

We invest in private companies, directly or through third party investment funds, including Small Business Investment Companies, real estate funds and Low Income Housing Tax Credit funds. These funds are generally structured as closed-end limited partnerships wherein we hold a limited partner interest. For the year ended October 31, 2018, we have unfunded commitments of $948 million (October 31, 2017 – $1,081 million[(1)]) representing the aggregate amount of cash we are obligated to be contributed as capital to these partnerships under the terms of the relevant contracts.

Pledged assets and collateral

In the ordinary course of business, we pledge assets and enter into collateral agreements with terms and conditions that are usual and customary to our regular lending, borrowing and trading activities recorded on our Consolidated Balance Sheets. The following are examples of our general terms and conditions on pledged assets and collateral:

- The risks and rewards of the pledged assets reside with the pledgor.
- The pledged asset is returned to the pledgor when the necessary conditions have been satisfied.
- The right of the pledgee to sell or re-pledge the asset is dependent on the specific agreement under which the collateral is pledged.
- If there is no default, the pledgee must return the comparable asset to the pledgor upon satisfaction of the obligation.

We are also required to provide intraday pledges to the Bank of Canada when we use the Large Value Transfer System (LVTS), which is a real-time electronic wire transfer system that continuously processes all Canadian dollar large-value or time-critical payments throughout the day. The pledged assets earmarked for LVTS activities are normally released back to us at the end of the settlement cycle each day. Therefore, the pledged assets amount is not included in the table below. For the year ended October 31, 2018, we had on average $4.0 billion of assets pledged intraday to the Bank of Canada on a daily basis (October 31, 2017 – $3.7 billion). There are infrequent occasions where we are required to take an overnight advance from the Bank of Canada to cover a settlement requirement, in which case an equivalent value of the pledged assets would be used to secure the advance. There were no overnight advances taken on October 31, 2018 and October 31, 2017.

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

Details of assets pledged against liabilities and collateral assets held or re-pledged are shown in the following tables:

(Millions of Canadian dollars)	As at October 31 2018	As at October 31 2017 (1)
Sources of pledged assets and collateral		
Bank assets		
Loans	$ 79,798	$ 80,467
Securities	48,993	43,149
Other assets	19,406	19,524
	148,197	143,140
Client assets (2)		
Collateral received and available for sale or re-pledging	402,187	288,945
Less: not sold or re-pledged	(53,590)	(56,820)
	348,597	232,125
	$ 496,794	$ 375,265
Uses of pledged assets and collateral		
Securities borrowing and lending	$ 119,087	$ 70,893
Obligations related to securities sold short	32,247	30,008
Obligations related to securities lent or sold under repurchase agreements	209,353	145,342
Securitization	49,997	48,461
Covered bonds	36,959	37,041
Derivative transactions	21,110	21,508
Foreign governments and central banks	5,058	3,280
Clearing systems, payment systems and depositories	4,006	3,621
Other	18,977	15,111
	$ 496,794	$ 375,265

(1) Amounts have been revised from those previously presented.
(2) Primarily relates to Obligations related to securities lent or sold under repurchase agreements, Securities lent and Derivative transactions.

Lease commitments

Finance lease commitments

We lease computer equipment from third parties under finance lease arrangements. The leases have various terms, escalation and renewal rights. The future minimum lease payments under the finance leases are as follows:

(Millions of Canadian dollars)	October 31, 2018 Total future minimum lease payments	October 31, 2018 Future interest charges	October 31, 2018 Present value of finance lease commitments	October 31, 2017 Total future minimum lease payments	October 31, 2017 Future interest charges	October 31, 2017 Present value of finance lease commitments
Future minimum lease payments						
No later than one year	$ 25	$ (2)	$ 23	$ 17	$ (2)	$ 15
Later than one year and no later than five years	25	(2)	23	21	(2)	19
	$ 50	$ (4)	$ 46	$ 38	$ (4)	$ 34

The net carrying amount of computer equipment held under finance lease as at October 31, 2018 was $47 million (October 31, 2017 – $44 million).

Operating lease commitments

We are obligated under a number of non-cancellable operating leases for premises and equipment. These leases have various terms, escalation and renewal rights. The lease agreements do not include any clauses that impose any restriction on our ability to pay dividends, engage in debt financing transactions, or enter into further lease agreements. The minimum future lease payments under non-cancellable operating leases are as follows:

(Millions of Canadian dollars)	October 31, 2018 Land and buildings	October 31, 2018 Equipment	October 31, 2017 Land and buildings	October 31, 2017 Equipment
Future minimum lease payments				
No later than one year	$ 684	$ 103	$ 643	$ 94
Later than one year and no later than five years	2,081	137	2,006	192
Later than five years	2,816	–	2,868	–
	5,581	240	5,517	286
Less: Future minimum sublease payments to be received	(11)	–	(21)	–
Net future minimum lease payments	$ 5,570	$ 240	$ 5,496	$ 286

Note 25 Legal and regulatory matters

We are a large global institution that is subject to many different complex legal and regulatory requirements that continue to evolve. We are and have been subject to a variety of legal proceedings, including civil claims and lawsuits, regulatory examinations, investigations, audits and requests for information by various governmental regulatory agencies and law enforcement authorities in various jurisdictions. Some of these matters may involve novel legal theories and interpretations and may be advanced under criminal as well as civil statutes, and some proceedings could result in the imposition of civil, regulatory enforcement or criminal penalties. We review the status of all proceedings on an ongoing basis and will exercise judgment in resolving them in such manner as we believe to be in our best interest. This is an area of significant judgment and uncertainty and the extent of our financial and other exposure to these proceedings after taking into account current accruals could be material to our results of operations in any particular period. The following is a description of our significant legal proceedings.

LIBOR regulatory investigations and litigation
Various regulators and competition and enforcement authorities around the world, including in Canada, the United Kingdom, and the U.S., are conducting investigations related to certain past submissions made by panel banks in connection with the setting of the U.S. dollar London interbank offered rate (LIBOR). These investigations focus on allegations of collusion between the banks that were on the panel to make submissions for certain LIBOR rates. Royal Bank of Canada is a member of certain LIBOR panels, including the U.S. dollar LIBOR panel, and has in the past been the subject of regulatory requests for information. In addition, Royal Bank of Canada and other U.S. dollar panel banks have been named as defendants in private lawsuits filed in the U.S. with respect to the setting of LIBOR including a number of class action lawsuits which have been consolidated before the U.S. District Court for the Southern District of New York. The complaints in those private lawsuits assert claims against us and other panel banks under various U.S. laws, including U.S. antitrust laws, the U.S. Commodity Exchange Act, and state law. On February 28, 2018, the motion by the plaintiffs in the class action lawsuits to have the class certified was denied in relation to Royal Bank of Canada. As such, unless that ruling is reversed on appeal, Royal Bank of Canada is no longer a defendant in any pending class action. Royal Bank of Canada is still a party to the various individual LIBOR actions. Based on the facts currently known, it is not possible at this time for us to predict the ultimate outcome of these investigations or proceedings or the timing of their resolution.

Royal Bank of Canada Trust Company (Bahamas) Limited proceedings
On April 13, 2015, a French investigating judge notified Royal Bank of Canada Trust Company (Bahamas) Limited (RBC Bahamas) of the issuance of an *ordonnance de renvoi* referring RBC Bahamas and other unrelated persons to the French *tribunal correctionnel* to face the charge of complicity in estate tax fraud relating to actions taken relating to a trust for which RBC Bahamas serves as trustee. RBC Bahamas believes that its actions did not violate French law and contested the charge in the French court. On January 12, 2017, the French court acquitted all parties including RBC Bahamas and on June 29, 2018, the French appellate court affirmed the acquittals. The acquittals are being appealed.

On October 28, 2016, Royal Bank of Canada was granted an exemption by the U.S. Department of Labor that will allow Royal Bank of Canada and its current and future affiliates to continue to qualify for the Qualified Professional Asset Manager exemption under the Employee Retirement Income Security Act despite any potential conviction of RBC Bahamas in the French proceeding for a temporary one year period from the date of conviction. An application to grant more lengthy exemptive relief is pending.

RBC Bahamas continues to review the trustee's and the trust's legal obligations, including liabilities and potential liabilities under applicable tax and other laws. Based on the facts currently known, it is not possible at this time to predict the ultimate outcome of these matters; however, we believe that the ultimate resolution will not have a material effect on our consolidated financial position, although it may be material to our results of operations in the period it occurs.

Interchange fees litigation
Since 2011, seven proposed class actions have been commenced in Canada: *Bancroft-Snell v. Visa Canada Corporation, et al., 9085-4886 Quebec Inc. v. Visa Canada Corporation, et al., Coburn and Watson's Metropolitan Home v. Bank of America Corporation, et al. (Watson), Macaronies Hair Club and Laser Centre Inc. v. BofA Canada Bank, et al., 1023926 Alberta Ltd. v. Bank of America Corporation, et al., The Crown & Hand Pub Ltd. v. Bank of America Corporation, et al., and Hello Baby Equipment Inc. v. BofA Canada Bank, et al.* The defendants in each action are VISA Canada Corporation (Visa), MasterCard International Incorporated (MasterCard), Royal Bank of Canada and other financial institutions. The plaintiff class members are Canadian merchants who accept Visa and/or MasterCard branded credit cards for payment. The actions allege, among other things, that from March 2001 to the present, Visa and MasterCard conspired with their issuing banks and acquirers to set default interchange rates and merchant discount fees and that certain rules (Honour All Cards and No Surcharge) have the effect of increasing the merchant discount fees. The actions include claims of civil conspiracy, breach of the *Competition Act*, interference with economic relations and unjust enrichment. The claims seek unspecified general and punitive damages. In *Watson*, a decision to partially certify the action as a class proceeding was released on March 27, 2014, and was appealed. On August 19, 2015, the British Columbia Court of Appeal struck the plaintiff class representative's cause of action under section 45 of the *Competition Act* and reinstated the plaintiff class representative's cause of action in civil conspiracy by unlawful means, among other rulings. In October 2016, the trial court in *Watson* denied a motion by the plaintiff to revive the stricken section 45 *Competition Act* claim, and also denied the plaintiff's motion to add new causes of action. The Supreme Court of Canada declined the B.C. class action plaintiffs' request to appeal the decision striking the plaintiffs' cause of action under section 45 of the *Competition Act*.

In 9085-4886 Quebec Inc. v. Visa Canada Corporation, et al., the Quebec-court dismissed the Competition Act claims by Quebec merchants for post-2010 damages and certified a class as to the remaining claims. The merchants have appealed the dismissal of their claims in the Quebec authorization decision. No date has yet been assigned to the appeal.

Based on the facts currently known, it is not possible at this time for us to predict the ultimate outcome of these proceedings or the timing of their resolution.

Foreign exchange matters
Various regulators are conducting inquiries regarding potential violations of antitrust law by a number of banks, including Royal Bank of Canada, regarding foreign exchange trading.

Beginning in 2015, putative class actions were brought against Royal Bank of Canada and/or RBC Capital Markets, LLC in the United States, Canada, and Israel. These actions were each brought against multiple foreign exchange dealers and allege, among other things, collusive behaviour in global foreign exchange trading. In August 2018, the U.S. District Court entered a final order approving RBC Capital Markets' pending settlement with class plaintiffs. In November 2018, certain institutional plaintiffs who had previously opted-out of participating in the settlement filed their own lawsuit in US District Court. The Canadian class actions, one other U.S. action that is purportedly brought on behalf of different classes of plaintiffs, and a purported class action recently filed in Israel remain pending.

In its discretion Royal Bank of Canada may choose to resolve claims, litigations, or similar matters at any time. Based on the facts currently known, it is not possible at this time to predict the ultimate outcome of the Foreign Exchange Matters or the timing of their ultimate resolution.

Other matters

We are a defendant in a number of other actions alleging that certain of our practices and actions were improper. The lawsuits involve a variety of complex issues and the timing of their resolution is varied and uncertain. Management believes that we will ultimately be successful in resolving these lawsuits, to the extent that we are able to assess them, without material financial impact to the Bank. This is, however, an area of significant judgment and the potential liability resulting from these lawsuits could be material to our results of operations in any particular period.

Various other legal proceedings are pending that challenge certain of our other practices or actions. While this is an area of significant judgment and some matters are currently inestimable, we consider that the aggregate liability, to the extent that we are able to assess it, resulting from these other proceedings will not be material to our consolidated financial position or results of operations.

Note 26 Related party transactions

Related parties

Related parties include associated companies, post-employment benefit plans for the benefit of our employees, key management personnel (KMP), the Board of Directors (Directors), close family members of KMP and Directors, and entities which are, directly or indirectly, controlled by, jointly controlled by or significantly influenced by KMP, Directors or their close family members.

Key management personnel and Directors

KMP are defined as those persons having authority and responsibility for planning, directing and controlling our activities, directly or indirectly. They include the senior members of our organization called the Group Executive. The Group Executive is comprised of the President and Chief Executive Officer and individuals that report directly to him, including the Chief Administrative Officer, Chief Financial Officer, Chief Human Resources Officer, Group Chief Risk Officer, Chief Strategy & Corporate Development Officer, and Group Heads for Wealth Management and Insurance, Capital Markets and Investor & Treasury Services, Technology & Operations, and Personal & Commercial Banking. The Directors do not plan, direct, or control the activities of the entity; they oversee the management of the business and provide stewardship.

Compensation of Key management personnel and Directors

	For the year ended	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Salaries and other short-term employee benefits (1)	**$ 34**	$ 33
Post-employment benefits (2)	**2**	2
Share-based payments	**42**	37
	$ 78	$ 72

(1) Includes the portion of the annual variable short-term incentive bonus that certain executives elected to receive in the form of DSUs. Refer to Note 21 for further details. Directors receive retainers but do not receive salaries and other short-term employee benefits.

(2) Directors do not receive post-employment benefits.

Stock options, stock awards and shares held by Key management personnel, Directors and their close family members

	As at			
	October 31, 2018		October 31, 2017	
(Millions of Canadian dollars, except number of units)	**No. of units held**	**Value**	No. of units held	Value
Stock options (1)	**2,154,835**	**$ 37**	2,174,841	$ 60
Other non-option stock based awards (1)	**1,440,002**	**138**	1,371,104	138
RBC common and preferred shares	**453,316**	**43**	632,631	64
	4,048,153	**$ 218**	4,178,576	$ 262

(1) Directors do not receive stock options or any other non-option stock based awards.

Transactions, arrangements and agreements involving Key management personnel, Directors and their close family members

In the normal course of business, we provide certain banking services to KMP, Directors, and their close family members. These transactions were made on substantially the same terms, including interest rates and security, as for comparable transactions with persons of a similar standing and did not involve more than the normal risk of repayment or present other unfavourable features.

As at October 31, 2018, total loans to KMP, Directors and their close family members were $10 million (October 31, 2017 – $10 million). We have no Stage 3 allowance or provision for credit losses relating to these loans as at and for the years ended October 31, 2018 and October 31, 2017. No guarantees, pledges or commitments have been given to KMP, Directors or their close family members.

Joint ventures and associates

In the normal course of business, we provide certain banking and financial services to our joint ventures and associates, including loans, interest and non-interest bearing deposits. These transactions meet the definition of related party transactions and were made on substantially the same terms as for comparable transactions with third parties.

As at October 31, 2018, loans to joint ventures and associates were $225 million (October 31, 2017 – $200 million) and deposits from joint ventures and associates were $203 million (October 31, 2017 – $123 million). We have no Stage 3 allowance or provision for credit losses relating to loans to joint ventures and associates as at and for the years ended October 31, 2018 and October 31, 2017. $1 million of guarantees have been given to joint ventures and associates for the year ended October 31, 2018 (October 31, 2017 – $1 million).

Other transactions, arrangements or agreements involving joint ventures and associates

	As at or for the year ended	
(Millions of Canadian dollars)	October 31 2018	October 31 2017
Commitments and other contingencies	$ 621	$ 870
Other fees received for services rendered	41	40
Other fees paid for services received	150	182

Note 27 Results by business segment

Composition of business segments
For management purposes, based on the products and services offered, we are organized into five business segments: Personal & Commercial Banking, Wealth Management, Insurance, Investor & Treasury Services and Capital Markets.

Personal & Commercial Banking provides a broad suite of financial products and services to individuals and businesses for their day-to-day banking, investing and financing needs through two businesses: Canadian Banking and Caribbean & U.S. Banking. In Canada, we provide a broad suite of financial products and services through our large branch network, automated teller machines, and mobile sales network. In the Caribbean and the U.S., we offer a broad range of financial products and services in targeted markets. Non-interest income in Personal & Commercial Banking mainly comprises Mutual fund revenue, Service charges and Card service revenue.

Wealth Management serves high net worth and ultra-high net worth individual and institutional clients with a comprehensive suite of advice-based solutions and strategies to help them achieve their financial goals through our line of businesses in Canada, the U.S., the U.K., Europe and Asia, including Canadian Wealth Management, U.S. Wealth Management (including City National), Global Asset Management, and International Wealth Management. Non-interest income in Wealth Management mainly comprises Investment management and custodial fees, Mutual fund revenue and Securities brokerage commissions.

Insurance has operations in Canada and globally, operating under two business lines: Canadian Insurance and International Insurance, providing a wide range of life, health, home, auto, travel, wealth, annuities and reinsurance advice and solutions as well as creditor and business insurance services to individual, business and group clients. In Canada, we offer our products and services through our proprietary distribution channels, comprised of the field sales force, advice centers and online, as well as through independent insurance advisors and affinity relationships. Outside Canada, we operate in reinsurance and retrocession markets globally offering life, disability and longevity reinsurance products. Non-interest income in Insurance comprises Insurance premiums, investment and fee income.

Investor & Treasury Services is a provider of asset, cash management, transaction banking, and treasury services to institutional clients worldwide. We also provide Canadian dollar cash management, correspondent banking and trade finance for financial institutions globally and short-term funding and liquidity management for the bank. Non-interest income in Investor & Treasury Services mainly comprises Investment management and custodial fees.

Capital Markets provides expertise in banking, finance and capital markets to corporations, institutional investors, asset managers, governments and central banks around the world in our two main business lines: Corporate and Investment Banking and Global Markets. In North America, we offer a full suite of products and services which include corporate and investment banking, equity and debt origination and distribution, as well as sales and trading. Outside North America, we have a select presence in the U.K. and Europe, and Australia, Asia and other markets, where we offer a diversified set of capabilities in our key sectors of expertise such as energy, mining and infrastructure, industrial, consumer, health care and technology in Europe. Non-interest income in Capital Markets mainly includes Trading revenue, Underwriting and other advisory fees and Credit fees.

All other enterprise level activities that are not allocated to these five business segments, such as enterprise funding, securitizations, net charges associated with unattributed capital, and consolidation adjustments, including the elimination of the Taxable equivalent basis (Teb) gross-up amounts, are included in Corporate Support. Teb adjustments gross up income from certain tax-advantaged sources from Canadian taxable corporate dividends and U.S. tax credit investments recorded in Capital Markets to their effective tax equivalent value with the corresponding offset recorded in the provision for income taxes. Management believes that these Teb adjustments are necessary for Capital Markets to reflect how it is managed and enhances the comparability of revenue across our taxable and tax-advantaged sources. Our use of Teb adjustments may not be comparable to similarly adjusted amounts at other financial institutions. The Teb adjustment for the year ended October 31, 2018 was $542 million (October 31, 2017 – $548 million).

Geographic segments
For geographic reporting, our segments are grouped into Canada, United States and Other International. Transactions are primarily recorded in the location that best reflects the risk due to negative changes in economic conditions and prospects for growth due to positive economic changes. This location frequently corresponds with the location of the legal entity through which the business is conducted and the location of our clients. Transactions are recorded in the local currency and are subject to foreign exchange rate fluctuations with respect to the movement in the Canadian dollar.

Management reporting framework
Our management reporting framework is intended to measure the performance of each business segment as if it were a stand-alone business and reflects the way that the business segment is managed. This approach is intended to ensure that our business segments' results include all applicable revenue and expenses associated with the conduct of their business and depicts how management views those results. We regularly monitor these segment results for the purpose of making decisions about resource allocation and performance assessment. These items do not impact our consolidated results.

The expenses in each business segment may include costs or services directly incurred or provided on their behalf at the enterprise level. For other costs not directly attributable to one of our business segments, we use a management reporting framework that uses assumptions and methodologies for allocating overhead costs and indirect expenses to our business segments and that assists in the attribution of capital and the transfer pricing of funds to our business segments in a manner that consistently measures and aligns the economic costs with the underlying benefits and risks of that specific business segment. Activities and business conducted between our business segments are generally at market rates. All other enterprise level activities that are not allocated to our five business segments are reported under Corporate Support.

Our assumptions and methodologies used in our management reporting framework are periodically reviewed by us to ensure that they remain valid. The capital attribution methodologies involve a number of assumptions that are revised periodically.

	For the year ended October 31, 2018									
(Millions of Canadian dollars)	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Canada	United States	Other International
Net interest income (2) (3)	$ 11,776	$ 2,602	$ –	$ 297	$ 3,567	$ (51)	$ 18,191	$ 13,076	$ 3,616	$ 1,499
Non-interest income (2)	5,140	8,324	4,279	2,294	4,831	(483)	24,385	12,698	6,080	5,607
Total revenue	16,916	10,926	4,279	2,591	8,398	(534)	42,576	25,774	9,696	7,106
Provision for credit losses (4)	1,273	(15)	–	1	48	–	1,307	1,259	41	7
Insurance policyholder benefits, claims and acquisition expense	–	–	2,676	–	–	–	2,676	1,347	–	1,329
Non-interest expense	7,526	8,070	602	1,617	4,960	58	22,833	11,634	7,322	3,877
Net income (loss) before income taxes	8,117	2,871	1,001	973	3,390	(592)	15,760	11,534	2,333	1,893
Income taxes (recoveries)	2,089	606	226	232	613	(437)	3,329	2,661	402	266
Net income	$ 6,028	$ 2,265	$ 775	$ 741	$ 2,777	$ (155)	$ 12,431	$ 8,873	$ 1,931	$ 1,627
Non-interest expense includes:										
Depreciation and amortization	$ 579	$ 544	$ 36	$ 124	$ 363	$ –	$ 1,646	$ 1,102	$ 389	$ 155
Impairment of other intangibles	–	–	–	1	1	4	6	4	1	1
Total assets	$ 453,879	$ 93,063	$ 16,210	$ 136,030	$ 590,950	$ 44,602	$ 1,334,734	$ 680,276	$ 384,921	$ 269,537
Total assets include:										
Additions to premises and equipment and intangibles	$ 279	$ 431	$ 45	$ 187	$ 442	$ 579	$ 1,963	$ 1,196	$ 503	$ 264
Total liabilities	$ 453,878	$ 93,162	$ 16,289	$ 135,944	$ 590,582	$ (35,076)	$ 1,254,779	$ 600,619	$ 384,816	$ 269,344

	For the year ended October 31, 2017									
(Millions of Canadian dollars)	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Canada	United States	Other International
Net interest income (2) (3)	$ 10,787	$ 2,248	$ –	$ 679	$ 3,565	$ (139)	$ 17,140	$ 11,965	$ 3,572	$ 1,603
Non-interest income (2)	5,076	7,827	4,566	1,756	4,617	(313)	23,529	12,701	5,606	5,222
Total revenue	15,863	10,075	4,566	2,435	8,182	(452)	40,669	24,666	9,178	6,825
Provision for credit losses (4)	1,054	34	–	–	62	–	1,150	951	107	92
Insurance policyholder benefits, claims and acquisition expense	–	–	3,053	–	–	–	3,053	1,793	–	1,260
Non-interest expense	7,176	7,611	584	1,466	4,719	238	21,794	11,219	6,889	3,686
Net income (loss) before income taxes	7,633	2,430	929	969	3,401	(690)	14,672	10,703	2,182	1,787
Income taxes (recoveries)	1,878	592	203	228	876	(574)	3,203	2,472	468	263
Net income	$ 5,755	$ 1,838	$ 726	$ 741	$ 2,525	$ (116)	$ 11,469	$ 8,231	$ 1,714	$ 1,524
Non-interest expense includes:										
Depreciation and amortization	$ 582	$ 526	$ 33	$ 105	$ 352	$ 17	$ 1,615	$ 959	$ 465	$ 191
Impairment of other intangibles	–	–	–	–	–	2	2	2	–	–
Total assets	$ 433,532	$ 89,493	$ 15,122	$ 133,126	$ 506,118	$ 35,462	$ 1,212,853	$ 644,292	$ 323,895	$ 244,666
Total assets include:										
Additions to premises and equipment and intangibles	$ 331	$ 269	$ 43	$ 74	$ 296	$ 485	$ 1,498	$ 1,021	$ 321	$ 156
Total liabilities	$ 433,554	$ 89,571	$ 15,172	$ 132,987	$ 505,952	$ (38,811)	$ 1,138,425	$ 569,889	$ 323,911	$ 244,625

(1) Taxable equivalent basis.
(2) Inter-segment revenue and share of profit (loss) in joint ventures and associates are not material except as disclosed in Note 11.
(3) Interest revenue is reported net of interest expense as we rely primarily on net interest income as a performance measure.
(4) Under IFRS 9, PCL on performing (Stages 1 and 2) financial assets is recorded within the respective business segment. Under IAS 39 and prior to November 1, 2017, PCL on loans not yet identified as impaired was included in Corporate Support.

Note 28 Nature and extent of risks arising from financial instruments

We are exposed to credit, market and liquidity and funding risks as a result of holding financial instruments. Our risk measurement and objectives, policies and methodologies for managing these risks are disclosed in the shaded text along with those tables specifically marked with an asterisk (*) in the Credit risk section of Management's Discussion and Analysis. These shaded text and tables are an integral part of these Consolidated Financial Statements.

Concentrations of credit risk exist if a number of our counterparties are engaged in similar activities, are located in the same geographic region or have comparable economic characteristics such that their ability to meet contractual obligations would be similarly affected by changes in economic, political or other conditions.

Concentrations of credit risk indicate the relative sensitivity of our performance to developments affecting a particular industry or geographic location. The amounts of credit exposure associated with certain of our on- and off-balance sheet financial instruments are summarized in the following table.

	As at October 31, 2018								
(Millions of Canadian dollars, except percentage amounts)	Canada	%	United States	%	Europe	%	Other International	%	Total
On-balance sheet assets other than derivatives (1)	$ 594,823	66%	$ 184,040	21%	$ 60,645	7%	$ 50,486	6%	$ 889,994
Derivatives before master netting agreements (2) (3)	18,364	19	20,053	21	50,767	53	6,063	7	95,247
	$ 613,187	62%	$ 204,093	21%	$ 111,412	11%	$ 56,549	6%	$ 985,241
Off-balance sheet credit instruments (4)									
Committed and uncommitted (5)	$ 345,545	66%	$ 142,692	27%	$ 31,530	6%	$ 7,140	1%	$ 526,907
Other	79,399	61	14,852	11	34,849	27	987	1	130,087
	$ 424,944	65%	$ 157,544	24%	$ 66,379	10%	$ 8,127	1%	$ 656,994

	As at October 31, 2017								
(Millions of Canadian dollars, except percentage amounts)	Canada	%	United States	%	Europe	%	Other International	%	Total
On-balance sheet assets other than derivatives (1)	$ 531,294	68%	$ 145,824	19%	$ 55,265	7%	$ 49,829	6%	$ 782,212
Derivatives before master netting agreements (2) (3)	14,915	9	24,530	15	118,469	72	5,661	4	163,575
	$ 546,209	58%	$ 170,354	18%	$ 173,734	18%	$ 55,490	6%	$ 945,787
Off-balance sheet credit instruments (4)									
Committed and uncommitted (5) (6)	$ 294,710	63%	$ 133,197	28%	$ 29,561	7%	$ 11,437	2%	$ 468,905
Other (6)	72,876	58	17,090	14	33,970	27	936	1	124,872
	$ 367,586	62%	$ 150,287	25%	$ 63,531	11%	$ 12,373	2%	$ 593,777

(1) Includes assets purchased under reverse repurchase agreements and securities borrowed, loans and customers' liability under acceptances. The largest concentrations in Canada are Ontario at 54% (October 31, 2017 – 50%), the Prairies at 18% (October 31, 2017 – 19%), British Columbia and the territories at 14% (October 31, 2017 – 15%) and Quebec at 10% (October 31, 2017 – 11%). No industry accounts for more than 47% (October 31, 2017 – 42%) of total on-balance sheet credit instruments.

(2) A further breakdown of our derivative exposures by risk rating and counterparty type is provided in Note 8.

(3) Excludes valuation adjustments determined on a pooled basis.

(4) Balances presented are contractual amounts representing our maximum exposure to credit risk.

(5) Represents our maximum exposure to credit risk. Retail and wholesale commitments respectively comprise 42% and 58% of our total commitments (October 31, 2017 – 39% and 61%). The largest concentrations in the wholesale portfolio relate to Non-bank financial services at 15% (October 31, 2017 – 9%), Utilities at 13% (October 31, 2017 – 9%), Technology & Media at 11% (October 31, 2017 – 8%), Consumer goods at 9% (October 31, 2017 – 6%), and Real estate & related at 8% (October 31, 2017 – 9%).

(6) Amount have been revised from those previously presented.

Note 29 Capital management

Regulatory capital and capital ratios

OSFI formally establishes risk-based capital and leverage targets for deposit-taking institutions in Canada. We are required to calculate our capital ratios using the Basel III framework. Under Basel III, regulatory capital includes Common Equity Tier 1 (CET1), Tier 1 and Tier 2 capital. CET1 capital mainly consists of common shares, retained earnings and other components of equity. Regulatory adjustments under Basel III include deductions of goodwill and other intangibles, certain deferred tax assets, defined benefit pension fund assets, investments in banking, financial and insurance entities, and the shortfall of provisions to expected losses. Tier 1 capital comprises predominantly CET1, with additional items that consist of capital instruments such as certain preferred shares, and certain non-controlling interests in subsidiaries. Tier 2 capital includes subordinated debentures that meet certain criteria and certain loan loss allowances. Total capital is the sum of CET1, additional Tier 1 capital and Tier 2 capital.

Regulatory capital ratios are calculated by dividing CET1, Tier 1 and Total capital by risk-weighted assets. The leverage ratio is calculated by dividing Tier 1 capital by an exposure measure. The exposure measure consists of total assets (excluding items deducted from Tier 1 capital) and certain off-balance sheet items converted into credit exposure equivalents. Adjustments are also made to derivatives and secured financing transactions to reflect credit and other risks.

During 2018 and 2017, we complied with all capital and leverage requirements imposed by OSFI.

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

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

(2) In fiscal 2018, the CVA scalars are 80%, 83% and 86%, respectively. In 2017, the scalars were 72%, 77% and 81%, respectively.

(3) Before any capital floor requirement as applicable, there are three different levels of RWAs for the calculation of the CET1, Tier 1, and Total capital ratios arising from the option we have chosen for the phase-in of the CVA capital charge. Since the introduction of Basel II in 2008, OSFI has prescribed a capital floor requirement for institutions that use the advanced internal ratings-based (AIRB) approach for credit risk. The capital floor was determined by comparing a capital requirement under Basel I and Basel III, as specified by OSFI. If the capital requirement under the Basel III standards was less than 90% of the capital requirements as calculated under the Basel I standards, the difference was added to the RWAs. Effective February 1, 2018, OSFI prescribed the transition from the current Basel I regulatory capital floor to a new regulatory capital floor of 75% of RWA based on the Basel II Standardized Approaches.

Note 30 Offsetting financial assets and financial liabilities

Offsetting within our Consolidated Balance Sheets may be achieved where financial assets and liabilities are subject to master netting arrangements that provide the currently enforceable right of offset and where there is an intention to settle on a net basis, or realize the assets and settle the liabilities simultaneously. For derivative contracts and repurchase and reverse repurchase arrangements, this is generally achieved when there is a market mechanism for settlement (e.g., central counterparty exchange or clearing house) which provides daily net settlement of cash flows arising from these contracts. Margin receivables and margin payables are generally offset as they settle simultaneously through a market settlement mechanism.

Amounts that do not qualify for offsetting include master netting arrangements that only permit outstanding transactions with the same counterparty to be offset in an event of default or occurrence of other predetermined events. Such master netting arrangements include the ISDA Master Agreement or certain derivative exchange or clearing counterparty agreements for derivative contracts, global master repurchase agreement and global master securities lending agreements for repurchase, reverse repurchase and other similar secured lending and borrowing arrangements.

The amount of financial collateral received or pledged subject to master netting arrangements or similar agreements but do not qualify for offsetting refers to the collateral received or pledged to cover the net exposure between counterparties by enabling the collateral to be realized in an event of default or the occurrence of other predetermined events. Certain amounts of collateral are restricted from being sold or re-pledged unless there is an event of default or the occurrence of other predetermined events.

The tables below provide the amount of financial instruments that have been offset on the Consolidated Balance Sheets and the amounts that do not qualify for offsetting but are subject to enforceable master netting arrangements or similar agreements. The amounts presented are not intended to represent our actual exposure to credit risk.

Financial assets subject to offsetting, enforceable master netting arrangements or similar agreements

	As at October 31, 2018							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial assets before balance sheet offsetting	Amounts of financial liabilities offset on the balance sheet	Net amount of financial assets presented on the balance sheet	Impact of master netting agreements	Financial collateral received (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Assets purchased under reverse repurchase agreements and securities borrowed	$ 312,392	$ 18,379	$ 294,013	$ 85	$ 292,808	$ 1,120	$ 589	$ 294,602
Derivative assets (3)	81,770	583	81,187	57,010	14,720	9,457	12,852	94,039
Other financial assets	3,315	3,054	261	–	244	17	–	261
	$ 397,477	$ 22,016	$ 375,461	$ 57,095	$ 307,772	$ 10,594	$ 13,441	$ 388,902

	As at October 31, 2017							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial assets before balance sheet offsetting	Amounts of financial liabilities offset on the balance sheet	Net amount of financial assets presented on the balance sheet	Impact of master netting agreements	Financial collateral received (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Assets purchased under reverse repurchase agreements and securities borrowed	$ 239,944	$ 20,470	$ 219,474	$ 24	$ 218,970	$ 480	$ 1,503	$ 220,977
Derivative assets (3)	151,451	67,827	83,624	58,804	16,357	8,463	11,399	95,023
Other financial assets	2,593	1,050	1,543	–	78	1,465	62	1,605
	$ 393,988	$ 89,347	$ 304,641	$ 58,828	$ 235,405	$ 10,408	$ 12,964	$ 317,605

(1) Financial collateral is reflected at fair value. The amount of financial instruments and financial collateral disclosed is limited to the net balance sheet exposure, and any over-collateralization is excluded from the table.
(2) Includes cash collateral of $10 billion (October 31, 2017 – $12 billion) and non-cash collateral of $297 billion (October 31, 2017 – $224 billion).
(3) Includes cash margin of $2.2 billion (October 31, 2017 – $0.6 billion) which offset against the derivative balance on the balance sheet.

Financial liabilities subject to offsetting, enforceable master netting arrangements or similar agreements

	As at October 31, 2018							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial liabilities before balance sheet offsetting	Amounts of financial assets offset on the balance sheet	Net amount of financial liabilities presented on the balance sheet	Impact of master netting agreements	Financial collateral pledged (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Obligations related to assets sold under repurchase agreements and securities loaned	$ 225,193	$ 18,379	$ 206,814	$ 85	$ 205,790	$ 939	$ –	$ 206,814
Derivative liabilities (3)	76,877	583	76,294	57,010	11,446	7,838	13,944	90,238
Other financial liabilities	3,061	3,005	56	–		56	–	56
	$ 305,131	$ 21,967	$ 283,164	$ 57,095	$ 217,236	$ 8,833	$ 13,944	$ 297,108

	As at October 31, 2017							
	Amounts subject to offsetting and enforceable netting arrangements							
				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)				
(Millions of Canadian dollars)	Gross amounts of financial liabilities before balance sheet offsetting	Amounts of financial assets offset on the balance sheet	Net amount of financial liabilities presented on the balance sheet	Impact of master netting agreements	Financial collateral pledged (2)	Net amount	Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
Obligations related to assets sold under repurchase agreements and securities loaned	$ 161,883	$ 20,470	$ 141,413	$ 24	$ 141,256	$ 133	$ 1,671	$ 143,084
Derivative liabilities (3)	145,855	67,705	78,150	58,804	10,697	8,649	13,977	92,127
Other financial liabilities	3,027	1,364	1,663	–	444	1,219	5	1,668
	$ 310,765	$ 89,539	$ 221,226	$ 58,828	$ 152,397	$ 10,001	$ 15,653	$ 236,879

(1) Financial collateral is reflected at fair value. The amount of financial instruments and financial collateral disclosed is limited to the net balance sheet exposure, and any over-collateralization is excluded from the table.
(2) Includes cash collateral of $11 billion (October 31, 2017 – $10 billion) and non-cash collateral of $206 billion (October 31, 2017 – $142 billion).
(3) Includes cash margin of $2.3 billion (October 31, 2017 – $0.3 billion) which offset against the derivative balance on the balance sheet.

Note 31 Recovery and settlement of on-balance sheet assets and liabilities

The table below presents an analysis of assets and liabilities recorded on our Consolidated Balance Sheets by amounts to be recovered or settled within one year and after one year, as at the balance sheet date, based on contractual maturities and certain other assumptions outlined in the footnotes below. As warranted, we manage the liquidity risk of various products based on historical behavioural patterns that are often not aligned with contractual maturities. Amounts to be recovered or settled within one year, as presented below, may not be reflective of our long-term view of the liquidity profile of certain balance sheet categories.

	As at					
	October 31, 2018			October 31, 2017		
(Millions of Canadian dollars)	Within one year	After one year	Total	Within one year	After one year	Total
Assets						
Cash and due from banks (1)	$ 28,583	$ 1,626	$ 30,209	$ 26,695	$ 1,712	$ 28,407
Interest-bearing deposits with banks	36,471	–	36,471	32,662	–	32,662
Securities						
Trading (2)	121,152	7,106	128,258	116,841	10,816	127,657
Investment, net of applicable allowance	16,795	77,813	94,608	15,930	74,792	90,722
Assets purchased under reverse repurchase agreements and securities borrowed	294,049	553	294,602	214,353	6,624	220,977
Loans						
Retail	97,414	302,038	399,452	97,784	287,386	385,170
Wholesale	43,280	136,998	180,278	38,573	121,033	159,606
Allowance for loan losses			(2,912)			(2,159)
Segregated fund net assets	–	1,368	1,368	–	1,216	1,216
Other						
Customers' liability under acceptances	15,635	6	15,641	16,443	16	16,459
Derivatives (2)	91,833	2,206	94,039	92,606	2,417	95,023
Premises and equipment	–	2,832	2,832	–	2,670	2,670
Goodwill	–	11,137	11,137	–	10,977	10,977
Other intangibles	–	4,687	4,687	–	4,507	4,507
Other assets	33,578	10,486	44,064	30,738	8,221	38,959
	$ 778,790	$ 558,856	$ 1,334,734	$ 682,625	$ 532,387	$ 1,212,853
Liabilities						
Deposits (3)	$ 669,682	$ 167,364	$ 837,046	$ 624,802	$ 164,833	$ 789,635
Segregated fund net liabilities	–	1,368	1,368	–	1,216	1,216
Other						
Acceptances	15,657	5	15,662	16,443	16	16,459
Obligations related to securities sold short	29,725	2,522	32,247	28,041	1,967	30,008
Obligations related to assets sold under repurchase agreements and securities loaned	206,813	1	206,814	143,072	12	143,084
Derivatives (2)	88,112	2,126	90,238	90,156	1,971	92,127
Insurance claims and policy benefit liabilities	1,691	8,309	10,000	131	9,545	9,676
Other liabilities	36,906	15,367	52,273	34,980	11,975	46,955
Subordinated debentures	103	9,028	9,131	–	9,265	9,265
	$ 1,048,689	$ 206,090	$ 1,254,779	$ 937,625	$ 200,800	$ 1,138,425

(1) Cash and due from banks are assumed to be recovered within one year, except for cash balances not available for use by the Bank.

(2) Trading securities classified as FVTPL and trading derivatives not designated in hedging relationships are presented as within one year as this best represents in most instances the short-term nature of our trading activities. Non-trading derivatives designated in hedging relationships are presented according to the recovery or settlement of the related hedged item.

(3) Demand deposits of $382 billion (October 31, 2017 – $372 billion) are presented as within one year due to their being repayable on demand or at short notice on a contractual basis.

Note 32 Parent company information

The following table presents information regarding the legal entity of Royal Bank of Canada with its subsidiaries presented on an equity accounted basis.

Condensed Balance Sheets

	As at	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Assets		
Cash and due from banks	**$ 16,398**	$ 12,901
Interest-bearing deposits with banks	**20,261**	20,864
Securities	**111,072**	109,082
Investments in bank subsidiaries and associated corporations (1)	**34,547**	31,302
Investments in other subsidiaries and associated corporations	**69,063**	65,576
Assets purchased under reverse repurchase agreements and securities borrowed	**107,941**	49,615
Loans, net of allowance for loan losses	**494,922**	474,052
Net balances due from bank subsidiaries (1)	**4,329**	20,579
Other assets	**137,821**	136,069
	$ 996,354	$ 920,040
Liabilities and shareholders' equity		
Deposits	**$ 643,120**	$ 605,849
Net balances due to other subsidiaries	**38,985**	58,598
Other liabilities	**225,626**	172,869
	907,731	837,316
Subordinated debentures	**8,762**	8,895
Shareholders' equity	**79,861**	73,829
	$ 996,354	$ 920,040

(1) Bank refers primarily to regulated deposit-taking institutions and securities firms.

Condensed Statements of Income and Comprehensive Income

	For the year ended	
(Millions of Canadian dollars)	**October 31 2018**	October 31 2017
Interest income (1)	**$ 22,578**	$ 18,419
Interest expense	**10,423**	6,556
Net interest income	**12,155**	11,863
Non-interest income (2)	**5,880**	4,476
Total revenue	**18,035**	16,339
Provision for credit losses	**1,294**	1,033
Non-interest expense	**9,085**	8,631
Income before income taxes	**7,656**	6,675
Income taxes	**1,546**	1,601
Net income before equity in undistributed income of subsidiaries	**6,110**	5,074
Equity in undistributed income of subsidiaries	**6,321**	6,395
Net income	**$ 12,431**	$ 11,469
Other comprehensive income (loss), net of taxes	**1,532**	(107)
Total comprehensive income	**$ 13,963**	$ 11,362

(1) Includes dividend income from investments in subsidiaries and associated corporations of $12 million (October 31, 2017 – $25 million).
(2) Includes share of profit (losses) from associated corporations of $(31) million (October 31, 2017 – $12 million).

Condensed Statements of Cash Flows

(Millions of Canadian dollars)	For the year ended October 31 2018	October 31 2017
Cash flows from operating activities		
Net income	$ 12,431	$ 11,469
Adjustments to determine net cash from operating activities:		
Change in undistributed earnings of subsidiaries	(6,321)	(6,395)
Change in deposits, net of securitizations	38,580	33,166
Change in loans, net of securitizations	(26,281)	(14,025)
Change in trading securities	3,730	24,671
Change in obligations related to assets sold under repurchase agreements and securities loaned	49,811	14,018
Change in assets purchased under reverse repurchase agreements and securities borrowed	(58,326)	(24,486)
Change in obligations related to securities sold short	2,600	(4,809)
Other operating activities, net	514	6,059
Net cash from (used in) operating activities	16,738	39,668
Cash flows from investing activities		
Change in interest-bearing deposits with banks	603	(4,738)
Proceeds from sale of investment securities	12,519	5,823
Proceeds from maturity of investment securities	17,836	25,599
Purchases of investment securities	(32,561)	(34,903)
Net acquisitions of premises and equipment and other intangibles	(1,173)	(938)
Change in cash invested in subsidiaries	93	(116)
Change in net funding provided to subsidiaries	(3,363)	(12,018)
Net cash from (used in) from investing activities	(6,046)	(21,291)
Cash flows from financing activities		
Repayment of subordinated debentures	–	(119)
Issue of common shares	72	199
Common shares purchased for cancellation	(1,522)	(3,110)
Redemption of preferred shares	(105)	(300)
Dividends paid	(5,640)	(5,309)
Issuance costs	–	(1)
Net cash from (used in) financing activities	(7,195)	(8,640)
Net change in cash and due from banks	3,497	9,737
Cash and due from banks at beginning of year	12,901	3,164
Cash and due from banks at end of year	$ 16,398	$ 12,901
Supplemental disclosure of cash flow information (1)		
Amount of interest paid	$ 9,486	$ 6,152
Amount of interest received	20,490	16,877
Amount of dividends received	1,414	1,291
Amount of income taxes paid	3,562	1,656

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

Note 33 Subsequent events

On November 2, 2018, we issued 14 million Non-Cumulative 5-Year Rate Reset Preferred Shares Series BO at a price of $25 per share to raise gross proceeds of $350 million.

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

Condensed Balance Sheets

(Millions of Canadian dollars) (1)	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010	2009
				IFRS					CGAAP		
Assets											
Cash and due from banks	$ 30,209	$ 28,407	$ 14,929	$ 12,452	$ 17,421	$ 15,550	$ 12,428	$ 12,428	$ 13,247	$ 8,440	$ 7,584
Interest-bearing deposits with banks	36,471	32,662	27,851	22,690	8,399	9,039	10,246	6,460	12,181	13,254	8,919
Securities, net of applicable allowance (2)	222,866	218,379	236,093	215,508	199,148	182,710	161,602	167,022	179,558	183,519	177,298
Assets purchased under reverse repurchase agreements and securities borrowed	294,602	220,977	186,302	174,723	135,580	117,517	112,257	84,947	84,947	72,698	41,580
Loans net of allowance	576,818	542,617	521,604	472,223	435,229	408,850	378,241	347,530	296,284	273,006	258,395
Other	173,768	169,811	193,479	176,612	144,773	126,079	149,180	175,446	165,485	175,289	161,213
Total Assets	$1,334,734	$ 1,212,853	$ 1,180,258	$ 1,074,208	$ 940,550	$ 859,745	$ 823,954	$ 793,833	$ 751,702	$ 726,206	$ 654,989
Liabilities											
Deposits	$ 837,046	$ 789,635	$ 757,589	$ 697,227	$ 614,100	$ 563,079	$ 512,244	$ 479,102	$ 444,181	$ 414,561	$ 378,457
Other	408,602	339,525	341,295	305,675	264,088	239,763	259,174	263,625	256,124	263,030	229,699
Subordinated debentures	9,131	9,265	9,762	7,362	7,859	7,443	7,615	8,749	7,749	6,681	6,461
Trust capital securities	–	–	–	–	–	–	–	894	–	727	1,395
Non-controlling interest in subsidiaries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,941	2,256	2,071
Total Liabilities	$1,254,779	$ 1,138,425	$ 1,108,646	$ 1,010,264	$ 886,047	$ 810,285	$ 779,033	$ 752,370	$ 709,995	$ 687,255	$ 618,083
Equity attributable to shareholders	79,861	73,829	71,017	62,146	52,690	47,665	43,160	39,702	41,707	38,951	36,906
Non-controlling interest	94	599	595	1,798	1,813	1,795	1,761	1,761	n.a.	n.a.	n.a.
Total equity	79,955	74,428	71,612	63,944	54,503	49,460	44,921	41,463	41,707	38,951	36,906
Total liabilities and equity	$1,334,734	$ 1,212,853	$ 1,180,258	$ 1,074,208	$ 940,550	$ 859,745	$ 823,954	$ 793,833	$ 751,702	$ 726,206	$ 654,989

Condensed Income Statements

(Millions of Canadian dollars) (1)	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010	2009
				IFRS					CGAAP		
Net interest income	$ 18,191	$ 17,140	$ 16,531	$ 14,771	$ 14,116	$ 13,249	$ 12,439	$ 11,357	$ 10,600	$ 10,338	$ 10,705
Non-interest income (3)	24,385	23,529	22,264	20,932	19,992	17,433	16,708	16,281	16,830	15,744	15,736
Total revenue (3)	42,576	40,669	38,795	35,703	34,108	30,682	29,147	27,638	27,430	26,082	26,441
Provision for credit losses (4)	1,307	1,150	1,546	1,097	1,164	1,237	1,299	1,133	975	1,240	2,167
Insurance policyholder benefits, claims and acquisition expense	2,676	3,053	3,424	2,963	3,573	2,784	3,621	3,358	3,360	3,546	3,042
Non-interest expense (3)	22,833	21,794	20,526	19,020	17,661	16,214	14,641	14,167	14,453	13,469	13,436
Non-controlling interest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	104	99	100
Net income from continuing operations	12,431	11,469	10,458	10,026	9,004	8,342	7,558	6,970	6,650	5,732	5,681
Net loss from discontinued operations	–	–	–	–	–	–	(51)	(526)	(1,798)	(509)	(1,823)
Net income	$ 12,431	$ 11,469	$ 10,458	$ 10,026	$ 9,004	$ 8,342	$ 7,507	6,444	$ 4,852	$ 5,223	$ 3,858

Other Statistics – reported

(Millions of Canadian dollars, except percentages and per share amounts) (1)	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010	2009
				IFRS					CGAAP		
PROFITABILITY MEASURES (5)											
Earnings per shares – basic	$ 8.39	$ 7.59	$ 6.80	$ 6.75	$ 6.03	$ 5.53	$ 4.96	$ 4.25	$ 3.21	$ 3.49	$ 2.59
– diluted	$ 8.36	$ 7.56	$ 6.78	$ 6.73	$ 6.00	$ 5.49	$ 4.91	$ 4.19	$ 3.19	$ 3.46	$ 2.57
Return on common equity (6), (7)	17.6%	17.0%	16.3%	18.6%	19.0%	19.7%	19.6%	18.7%	12.9%	14.9%	11.9%
Return on risk-weighted assets (8)	2.55%	2.49%	2.34%	2.45%	2.52%	2.67%	2.70%	2.44%	1.87%	2.03%	1.50%
Efficiency ratio (3)	53.6%	53.6%	52.9%	53.3%	51.8%	52.8%	50.2%	51.3%	52.7%	51.6%	50.8%
KEY RATIOS											
PCL on impaired loans as a % of average net loans and acceptances (9)	0.20%	0.21%	0.28%	0.24%	0.27%	0.31%	0.35%	0.33%	0.34%	0.45%	0.72%
Net interest margin (average earning assets, net) (6)	1.66%	1.72%	1.70%	1.71%	1.86%	1.88%	1.97%	1.86%	1.84%	1.99%	2.19%
SHARE INFORMATION											
Common shares outstanding (000s) – end of period (10)	1,438,794	1,452,535	1,484,235	1,443,955	1,443,125	1,441,722	1,445,846	1,438,522	1,438,522	1,423,203	1,415,483
Dividends declared per common share	$ 3.77	$ 3.48	$ 3.24	$ 3.08	$ 2.84	$ 2.53	$ 2.28	$ 2.08	$ 2.08	$ 2.00	$ 2.00
Dividend yield (11)	3.7%	3.8%	4.3%	4.1%	3.8%	4.0%	4.5%	3.9%	3.9%	3.6%	4.8%
Dividend payout ratio	45%	46%	48%	46%	47%	46%	46%	45%	47%	52%	52%
Book value per share	$ 51.12	$ 46.41	$ 43.32	$ 39.51	$ 33.69	$ 29.87	$ 26.52	$ 24.25	$ 25.65	$ 23.99	$ 22.67
Common share price (RY on TSX) (12)	$ 95.92	$ 100.87	$ 83.80	$ 74.77	$ 80.01	$ 70.02	$ 56.94	$ 48.62	$ 48.62	$ 54.39	$ 54.80
Market capitalization (TSX) (12)	138,009	146,554	124,476	107,925	115,393	100,903	82,296	69,934	69,934	77,502	77,685
Market price to book value	1.88	2.17	1.93	1.89	2.38	2.34	2.15	2.00	1.90	2.27	2.42
CAPITAL MEASURES – CONSOLIDATED (13)											
Common Equity Tier 1 capital ratio	11.5%	10.9%	10.8%	10.6%	9.9%	9.6%	n.a.	n.a.	n.a.	n.a.	n.a.
Tier 1 capital ratio	12.8%	12.3%	12.3%	12.2%	11.4%	11.7%	13.1%	n.a.	13.3%	13.0%	13.0%
Total capital ratio	14.6%	14.2%	14.4%	14.0%	13.4%	14.0%	15.1%	n.a.	15.3%	14.4%	14.2%
Leverage ratio	4.4%	4.4%	4.4%	4.3%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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

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

(3) Effective Q4 2017, service fees and other costs incurred in association with certain commissions and fees earned are presented on a gross basis in non-interest expense. As at November 1, 2014 comparative amounts have been reclassified to conform with this presentation.

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

(5) Ratios for 2009-2012 represent continuing operations.

(6) Average amounts are calculated using methods intended to approximate the average of the daily balances for the period. This includes Average common equity used in the calculation of ROE. For further details, refer to the Key performance and non-GAAP measures section of the MD&A.

(7) These measures may not have a standardized meaning under generally accepted accounting principles (GAAP) and may not be comparable to similar measures disclosed by other financial institutions. For further details, refer to the Key performance and non-GAAP measures section of the MD&A.

(8) Return on risk-weighted assets (RWA) for fiscal 2011 is based on RWA reported under Canadian Generally Accepted Accounting Policies (CGAAP) and Income reported under IFRS.

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

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

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

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

(13) Effective 2013, we calculate the capital ratios and multiples using the Basel III (all-in basis) framework unless otherwise stated. 2009-2012 capital ratios and multiples were calculated using the Basel II framework. Capital ratios and multiples for 2011 were determined under CGAAP.

Glossary

Acceptances
A bill of exchange or negotiable instrument drawn by the borrower for payment at maturity and accepted by a bank. The acceptance constitutes a guarantee of payment by the bank and can be traded in the money market. The bank earns a “stamping fee” for providing this guarantee.

Acquired Credit Impaired (ACI) loans
Represents loans identified as impaired on the acquisition date based on specific risk characteristics such as indications that the borrower is experiencing significant financial difficulty, probability of bankruptcy or other financial reorganization, payment status and economic conditions that correlate with defaults.

Allowance for credit losses (IFRS 9)
The amount deemed adequate by management to absorb expected credit losses as at the balance sheet date. The allowance is established for all financial assets subject to impairment assessment, including certain loans, debt securities, customers’ liability under acceptances, financial guarantees, and undrawn loan commitments. The allowance is changed by the amount of provision for credit losses recorded, which is charged to income, and decreased by the amount of write-offs net of recoveries in the period.

Allowance for credit losses (IAS 39)
The amount deemed adequate by management to absorb identified credit losses as well as losses that have been incurred but are not yet identifiable as at the balance sheet date. This allowance is established to cover the lending portfolio including loans, acceptances, guarantees, letters of credit, and unfunded commitments. The allowance is increased by the provision for credit losses, which is charged to income and decreased by the amount of write-offs, net of recoveries in the period.

Asset-backed securities (ABS)
Securities created through the securitization of a pool of assets, for example auto loans or credit card loans.

Assets under administration (AUA)
Assets administered by us, which are beneficially owned by clients, as at October 31, unless otherwise noted. Services provided in respect of assets under administration are of an administrative nature, including safekeeping, collecting investment income, settling purchase and sale transactions, and record keeping.

Assets under management (AUM)
Assets managed by us, which are beneficially owned by clients, as at October 31, unless otherwise noted. Services provided in respect of assets under management include the selection of investments and the provision of investment advice. We have assets under management that are also administered by us and included in assets under administration.

Auction rate securities (ARS)
Debt securities whose interest rate is regularly reset through an auction process

Average earning assets
Average earning assets include interest-bearing deposits with other banks including certain components of cash and due from banks, securities, assets purchased under reverse repurchase agreements and securities borrowed, loans, and excludes segregated fund net assets and other assets. The averages are based on the daily balances for the period.

Basis point (bp)
One one-hundredth of a percentage point (.01%).

Collateral
Assets pledged as security for a loan or other obligation. Collateral can take many forms, such as cash, highly rated securities, property, inventory, equipment and receivables.

Collateralized debt obligation (CDO)
Securities with multiple tranches that are issued by structured entities and collateralized by debt obligations including bonds and loans. Each tranche offers a varying degree of risk and return so as to meet investor demand.

Commercial mortgage-backed securities (CMBS)
Securities created through the securitization of commercial mortgages.

Commitments to extend credit
Unutilized amount of credit facilities available to clients either in the form of loans, bankers’ acceptances and other on-balance sheet financing, or through off-balance sheet products such as guarantees and letters of credit.

Common Equity Tier 1 (CET1) capital
A regulatory Basel III capital measure comprised mainly of common shareholders’ equity less regulatory deductions and adjustments for goodwill and intangibles, defined benefit pension fund assets, shortfall in allowances and other specified items.

Common Equity Tier 1 capital ratio
A risk-based capital measure calculated as CET1 capital divided by risk-weighted assets.

Covered bonds
Full recourse on-balance sheet obligations issued by banks and credit institutions that are also fully collateralized by assets over which investors enjoy a priority claim in the event of an issuer’s insolvency.

Credit default swaps (CDS)
A derivative contract that provides the purchaser with a one-time payment should the referenced entity/entities default (or a similar triggering event occur).

Derivative
A contract between two parties, which requires little or no initial investment and where payments between the parties are dependent upon the movements in price of an underlying instrument, index or financial rate. Examples of derivatives include swaps, options, forward rate agreements and futures. The notional amount of the derivative is the contract amount used as a reference point to calculate the payments to be exchanged between the two parties, and the notional amount itself is generally not exchanged by the parties.

Dividend payout ratio
Common dividends as a percentage of net income available to common shareholders.

Earnings per share (EPS), basic
Calculated as net income available to common shareholders divided by the average number of shares outstanding.

Earnings per share (EPS), diluted
Calculated as net income available to common shareholders divided by the average number of shares outstanding adjusted for the dilutive effects of stock options and other convertible securities.

Economic 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 businesses, given their risks, consistent with our desired solvency standard and credit ratings. The identified risks for which we calculate Economic Capital are credit, market (trading and non-trading), operational, business, fixed asset, and insurance. Additionally, Economic Capital includes goodwill and intangibles, and allows for diversification benefits across risks and business segments.

Expected credit losses
The difference between the contractual cash flows due to us in accordance with the relevant contractual terms and the cash flows that we expect to receive, discounted to the balance sheet date.

Fair value
Fair value of a financial instrument is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Federal Deposit Insurance Corporation (FDIC)
An independent U.S. government agency that aims to preserve and promote public confidence in the U.S. financial system by insuring deposits in banks and thrift institutions; identifying, monitoring and addressing risks to these deposits; and limiting the effect on the economic and financial system when a bank or thrift institution fails.

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

Guarantees and standby letters of credit
These primarily represent irrevocable assurances that a bank will make payments in the event that its client cannot meet its financial obligations to third parties. Certain other guarantees, such as bid and performance bonds, represent non-financial undertakings.

Hedge
A risk management technique used to mitigate exposure from market, interest rate or foreign currency exchange risk arising from normal banking operations. The elimination or reduction of such exposure is accomplished by establishing offsetting positions. For example, assets denominated in foreign currencies can be offset with liabilities in the same currencies or through the use of foreign exchange hedging instruments such as futures, options or foreign exchange contracts.

Hedge funds
A type of investment fund, marketed to accredited high net worth investors, that is subject to limited regulation and restrictions on its investments compared to retail mutual funds, and that often utilize aggressive strategies such as selling short, leverage, program trading, swaps, arbitrage and derivatives.

High-quality liquid assets (HQLA)
Assets are considered to be HQLA if they can be easily and immediately converted into cash at little or no loss of value during a time of stress.

Home equity products
This is comprised of residential mortgages and secured personal loans whereby the borrower pledges real estate as collateral.

International Financial Reporting Standards (IFRS)
IFRS are principles-based standards, interpretations and the framework adopted by the International Accounting Standards Board.

Impaired loans
Loans are classified as impaired when there has been a deterioration of credit quality to the extent that management no longer has reasonable assurance of timely collection of the full amount of principal and interest in accordance with the contractual terms of the loan agreement. Credit card balances are not classified as impaired as they are directly written off after payments are 180 days past due.

Innovative capital instruments
Innovative capital instruments are capital instruments issued by structured entities, whose primary purpose is to raise capital. We previously issued innovative capital instruments, RBC Trust Capital Securities (RBC TruCS), through RBC Capital Trust. As per OSFI Basel III guidelines, non-qualifying innovative capital instruments treated as additional Tier 1 capital are subject to phase out over a ten year period beginning on January 1, 2013.

Leverage ratio
A Basel III regulatory measure, the ratio divides Tier 1 capital by the sum of total assets plus specified off-balance sheet items.

Liquidity coverage ratio (LCR)
The Liquidity Coverage Ratio is a Basel III metric that measures the sufficiency of HQLA available to meet net short-term financial obligations over a thirty day period in an acute stress scenario.

Loan-to-value (LTV) ratio
Calculated based on the total facility amount for the residential mortgage and homeline product divided by the value of the related residential property.

Master netting agreement
An agreement between us and a counterparty designed to reduce the credit risk of multiple derivative transactions through the creation of a legal right of offset of exposure in the event of a default.

Net interest income
The difference between what is earned on assets such as loans and securities and what is paid on liabilities such as deposits and subordinated debentures.

Net interest margin (on average earning assets)
Calculated as net interest income divided by average earning assets.

Normal course issuer bid (NCIB)
A program for the repurchase of our own shares for cancellation through a stock exchange that is subject to the various rules of the relevant stock exchange and securities commission.

Notional amount
The contract amount used as a reference point to calculate payments for derivatives.

Off-balance sheet financial instruments
A variety of arrangements offered to clients, which include credit derivatives, written put options, backstop liquidity facilities, stable value products, financial standby letters of credit, performance guarantees, credit enhancements, mortgage loans sold with recourse, commitments to extend credit, securities lending, documentary and commercial letters of credit, note issuances and revolving underwriting facilities, securities lending indemnifications and indemnifications.

Office of the Superintendent of Financial Institutions Canada (OSFI)
The primary regulator of federally chartered financial institutions and federally administered pension plans in Canada. OSFI's mission is to safeguard policyholders, depositors and pension plan members from undue loss.

Operating leverage
The difference between our revenue growth rate and non-interest expense growth rate.

Options
A contract or a provision of a contract that gives one party (the option holder) the right, but not the obligation, to perform a specified transaction with another party (the option issuer or option writer) according to specified terms.

Primary dealer
A formal designation provided to a bank or securities broker-dealer permitted to trade directly with a country's central bank. Primary dealers participate in open market operations, act as market-makers of government debt and provide market information and analysis to assist with monetary policy.

Provision for credit losses (PCL)
The amount charged to income necessary to bring the allowance for credit losses to a level determined appropriate by management. Under IFRS 9, this includes provisions on performing and impaired financial assets. Prior to November 1, 2017, this included provisions on impaired loans and loans not yet identified as impaired.

Repurchase agreements
These involve the sale of securities for cash and the simultaneous repurchase of the securities for value at a later date. These transactions normally do not constitute economic sales and therefore are treated as collateralized financing transactions.

Return on common equity (ROE)
Net income available to common shareholders, expressed as a percentage of average common equity.

Reverse repurchase agreements
These involve the purchase of securities for cash and the simultaneous sale of the securities for value at a later date. These transactions normally do not constitute economic sales and therefore are treated as collateralized financing transactions.

Risk-weighted assets (RWA)
Assets adjusted by a regulatory risk-weight factor to reflect the riskiness of on and off-balance sheet exposures. Certain assets are not risk-weighted, but deducted from capital. The calculation is defined by guidelines issued by OSFI. For more details, refer to the Capital management section.

Securities lending
Transactions in which the owner of a security agrees to lend it under the terms of a prearranged contract to a borrower for a fee. The borrower must collateralize the security loan at all times. An intermediary such as a bank often acts as agent for the owner of the security. There are two types of securities lending arrangements: lending with and without credit or market risk indemnification. In securities lending without indemnification, the bank bears no risk of loss. For transactions in which the bank provides an indemnification, it bears the risk of loss if the borrower defaults and the value of the collateral declines concurrently.

Securities sold short
A transaction in which the seller sells securities and then borrows the securities in order to deliver them to the purchaser upon settlement. At a later date, the seller buys identical securities in the market to replace the borrowed securities.

Securitization
The process by which various financial assets are packaged into newly issued securities backed by these assets.

Structured entities
A structured entity is an entity in which voting or similar rights are not the dominant factor in deciding who controls the entity, such as when the activities that significantly affect the entity's returns are directed by means of contractual arrangements. Structured entities often have restricted activities, narrow and well defined objectives, insufficient equity to finance their activities, and financing in the form of multiple contractually-linked instruments.

Standardized Approach
Risk weights prescribed by OSFI are used to calculate risk-weighted assets for the credit risk exposures. Credit assessments by OSFI-recognized external credit rating agencies of S&P, Moody's, Fitch and DBRS are used to risk-weight our Sovereign and Bank exposures based on the standards and guidelines issued by OSFI. For our Business and Retail exposures, we use the standard risk weights prescribed by OSFI.

Structured investment vehicle
Managed investment vehicle that holds mainly highly rated asset-backed securities and funds itself using the short-term commercial paper market as well as the medium-term note (MTN) market.

Taxable equivalent basis (teb)
Income from certain specified tax advantaged sources (eligible Canadian taxable corporate dividends) is increased to a level that would make it comparable to income from taxable sources. There is an offsetting adjustment in the tax provision, thereby generating the same after-tax net income.

Tier 1 capital
Tier 1 capital comprises predominantly of CET1 capital, with additional Tier 1 items such as preferred shares, innovative instruments and non-controlling interests in subsidiaries Tier 1 instruments.

Tier 2 capital
Tier 2 capital consists mainly of subordinated debentures that meet certain criteria, certain loan loss allowances and non-controlling interests in subsidiaries' Tier 2 instruments.

Total capital and total capital ratio
Total capital is defined as the total of Tier 1 and Tier 2 capital. The total capital ratio is calculated by dividing total capital by risk-weighted assets.

Tranche
A security class created whereby the risks and returns associated with a pool of assets are packaged into several classes of securities offering different risk and return profiles from those of the underlying asset pool. Tranches are typically rated by ratings agencies, and reflect both the credit quality of underlying collateral as well as the level of protection based on the tranches' relative subordination.

Trust Capital Securities (RBC TruCS)
Transferable trust units issued by structured entities RBC Capital Trust or RBC Capital Trust II for the purpose of raising innovative Tier 1 capital.

Value-at-Risk (VaR)
A generally accepted risk-measurement concept that uses statistical models based on historical information to estimate within a given level of confidence the maximum loss in market value we would experience in our trading portfolio from an adverse one-day movement in market rates and prices.

Principal subsidiaries

(Millions of Canadian dollars)

Principal subsidiaries (1)	Principal office address (2)	Carrying value of voting shares owned by the Bank (3)
Royal Bank Holding Inc.	Toronto, Ontario, Canada	$ 60,725
RBC Insurance Holdings Inc.	Mississauga, Ontario, Canada	
RBC Life Insurance Company	Mississauga, Ontario, Canada	
R.B.C. Holdings (Bahamas) Limited	Nassau, New Providence, Bahamas	
RBC Caribbean Investments Limited	George Town, Grand Cayman, Cayman Islands	
Royal Bank of Canada Insurance Company Ltd.	St. Michael, Barbados	
Investment Holdings (Cayman) Limited	George Town, Grand Cayman, Cayman Islands	
RBC (Barbados) Funding Ltd.	St. Michael, Barbados	
Capital Funding Alberta Limited	Calgary, Alberta, Canada	
RBC Global Asset Management Inc.	Toronto, Ontario, Canada	
RBC Investor Services Trust	Toronto, Ontario, Canada	
RBC Investor Services Bank S.A.	Esch-sur-Alzette, Luxembourg	
RBC (Barbados) Trading Bank Corporation	St. James, Barbados	
RBC US Group Holdings LLC (2)	Toronto, Ontario, Canada	21,184
RBC USA Holdco Corporation (2)	New York, New York, U.S.	
RBC Capital Markets, LLC (2)	New York, New York, U.S.	
City National Bank	Los Angeles, California, U.S.	
RBC Dominion Securities Limited	Toronto, Ontario, Canada	9,249
RBC Dominion Securities Inc.	Toronto, Ontario, Canada	
RBC Finance S.à r.l./B.V. (2)	Amsterdam, Netherlands	3,048
RBC Holdings (Luxembourg) S.A R.L.	Luxembourg, Luxembourg	
RBC Holdings (Channel Islands) Limited	Jersey, Channel Islands	
Royal Bank of Canada (Channel Islands) Limited	Guernsey, Channel Islands	
RBC Europe Limited	London, England	2,202
Royal Bank Mortgage Corporation	Toronto, Ontario, Canada	1,241
The Royal Trust Company	Montreal, Quebec, Canada	777
Royal Trust Corporation of Canada	Toronto, Ontario, Canada	273

(1) The Bank directly or indirectly controls each subsidiary.

(2) Each subsidiary is incorporated or organized under the law of the state or country in which the principal office is situated, except for RBC US Group Holdings LLC and RBC USA Holdco Corporation which is incorporated under the laws of the State of Delaware, U.S., RBC Capital Markets, LLC, which are organized under the laws of the State of Minnesota, U.S. RBC Finance S.à r.l. / B.V. is a company incorporated in the Netherlands with its official seat in Amsterdam, the Netherlands, and place of effective management, central administration, and principal establishment in Luxembourg, Grand Duchy of Luxembourg.

(3) The carrying value of voting shares is stated as the Bank's equity in such investments.

Shareholder Information

Corporate headquarters
Street address:
Royal Bank of Canada
200 Bay Street
Toronto, Ontario M5J 2J5
Canada
Tel: 1-888-212-5533

Mailing address:
P.O. Box 1
Royal Bank Plaza
Toronto, Ontario M5J 2J5
Canada
website: rbc.com

Transfer Agent and Registrar
Main Agent:
Computershare Trust Company of Canada
1500 Robert-Bourassa Blvd.
Suite 700
Montreal, Quebec H3A 3S8
Canada
Tel: 1-866-586-7635 (Canada and the U.S.) or 514-982-7555 (International)
Fax: 514-982-7580
website: computershare.com/rbc

Co-Transfer Agent (U.S.):
Computershare Trust Company, N.A.
250 Royall Street
Canton, Massachusetts 02021
U.S.A.

Co-Transfer Agent (U.K.):
Computershare Investor Services PLC
Securities Services – Registrars
P.O. Box 82, The Pavilions,
Bridgwater Road,
Bristol BS99 6ZZ
U.K.

Stock exchange listings
(Symbol: RY)

Common shares are listed on:
Canada – Toronto Stock Exchange (TSX)
U.S. – New York Stock Exchange (NYSE)
Switzerland – Swiss Exchange (SIX)

All preferred shares are listed on the TSX with the exception of the series C-2. The related depository shares of the series C-2 preferred shares are listed on the NYSE.

Valuation day price
For Canadian income tax purposes, Royal Bank of Canada's common stock was quoted at $29.52 per share on the Valuation Day (December 22, 1971). This is equivalent to $7.38 per share after adjusting for the two-for-one stock split of March 1981 and the two-for- one stock split of February 1990. The one-for-one stock dividends in October 2000 and April 2006 did not affect the Valuation Day amount for our common shares.

Shareholder contacts
For dividend information, change in share registration or address, lost stock certificates, tax forms, estate transfers or dividend reinvestment, please contact:
Computershare Trust Company of Canada
100 University Avenue, 8th Floor
Toronto, Ontario M5J 2Y1
Canada

Tel: 1-866-586-7635 (Canada and the U.S.) or 514-982-7555 (International)
Fax: 1-888-453-0330 (Canada and the U.S.) or 416-263-9394 (International)
email: service@computershare.com

For other shareholder inquiries, please contact:
Shareholder Relations
Royal Bank of Canada
200 Bay Street
South Tower
Toronto, Ontario M5J 2J5
Canada
Tel: 416-955-7806

Financial analysts, portfolio managers, institutional investors
For financial information inquiries, please contact:
Investor Relations
Royal Bank of Canada
155 Wellington Street West
Toronto, Ontario M5V 3K7
Canada
Tel: 416-955-7802
or visit our website at rbc.com/investorrelations

Direct deposit service
Shareholders in Canada and the U.S. may have their RBC common share dividends deposited directly to their bank account by electronic funds transfer. To arrange for this service, please contact our Transfer Agent and Registrar, Computershare Trust Company of Canada.

Eligible dividend designation
For purposes of the *Income Tax Act* (Canada) and any corresponding provincial and territorial tax legislation, all dividends (and deemed dividends) paid by RBC to Canadian residents on both its common and preferred shares, are designated as "eligible dividends", unless stated otherwise.

Common share repurchases
We are engaged in a Normal Course Issuer Bid (NCIB) which allows us to repurchase for cancellation, up to 30 million common shares during the period spanning from February 27, 2018 to February 26, 2019, when the bid expires, or such earlier date as we may complete the purchases pursuant to our Notice of Intention filed with the Toronto Stock Exchange.

We determine the amount and timing of the purchases under the NCIB, subject to prior consultation with the Office of the Superintendent of Financial Institutions Canada.

A copy of our Notice of Intention to file a NCIB may be obtained, without charge, by contacting our Corporate Secretary at our Toronto mailing address.

2019 Quarterly earnings release dates

First quarter	February 22
Second quarter	May 23
Third quarter	August 21
Fourth quarter	December 4

2019 Annual Meeting
The Annual Meeting of Common Shareholders will be held on Thursday, April 4, 2019, at 9:30 a.m. (Atlantic Time) at the Halifax Convention Centre, 1650 Argyle Street, Halifax, Nova Scotia, Canada.

Dividend dates for 2019
Subject to approval by the Board of Directors

	Record dates	Payment dates
Common and preferred shares series W, AA, AC, AE, AF, AG, AJ, AK, AL, AZ, BB, BD, BF, BH, BI, BJ, BK, BM and BO	January 24 April 25 July 25 October 24	February 22 May 24 August 23 November 22
Preferred shares series C-2 (US$)	January 28 April 26 July 26 October 28	February 7 May 7 August 7 November 7

Governance
Summaries of the significant ways in which corporate governance practices followed by RBC differ from corporate governance practices required to be followed by U.S. domestic companies under the NYSE listing standards are available on our website at rbc.com/governance.