

REPORTS AND CONSOLIDATED FINANCIAL STATEMENTS

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Management's Responsibility for Financial Reporting

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

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

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

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

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

PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm appointed by our shareholders upon the recommendation of the Audit Committee and Board, has performed an independent audit of the consolidated financial statements in accordance with Canadian generally accepted auditing standards and the standards of the Public Company Accounting Oversight Board as stated in their Independent Auditor's Report and Report of Independent Registered Public Accounting Firm, respectively. The auditors have full and unrestricted access to the Audit Committee to discuss their audit and related findings.

David I. McKay
President and Chief Executive Officer

Rod Bolger
Chief Financial Officer

Toronto, December 3, 2019

Management's Report on Internal Control over Financial Reporting

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

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

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

Management evaluated, under the supervision of and with the participation of the President and Chief Executive Officer and Chief Financial Officer, the effectiveness of our internal control over financial reporting as of October 31, 2019, based on the criteria set forth in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on that evaluation, management concluded that, as of October 31, 2019, internal control over financial reporting was effective based on the criteria established in the *Internal Control – Integrated Framework (2013)*.

The effectiveness of our internal control over financial reporting as of October 31, 2019, has been audited by PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm, as stated in their Report of Independent Registered Public Accounting Firm, which appears herein.

David I. McKay
President and Chief Executive Officer

Rod Bolger
Chief Financial Officer

Toronto, December 3, 2019

To the Shareholders and Board of Directors of Royal Bank of Canada

Our opinion

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the financial position of Royal Bank of Canada and its subsidiaries (together, the Bank) as at October 31, 2019 and 2018, and its financial performance and its cash flows for the years then ended in accordance with International Financial Reporting Standards as issued by the International Accounting Standards Board (IFRS).

What we have audited

The Bank's consolidated financial statements comprise:

- the consolidated balance sheets as at October 31, 2019 and 2018;
- the consolidated statements of income for the years then ended;
- the consolidated statements of comprehensive income for the years then ended;
- the consolidated statements of changes in equity for the years then ended;
- the consolidated statements of cash flows for the years then ended; and
- the notes to the consolidated financial statements, which include a summary of significant accounting policies.

Certain required disclosures have been presented elsewhere in the Management's Discussion and Analysis, rather than in the notes to the consolidated financial statements. These disclosures are cross-referenced from the consolidated financial statements and are identified as audited.

Basis for opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the consolidated financial statements section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the Bank in accordance with the ethical requirements that are relevant to our audit of the consolidated financial statements in Canada. We have fulfilled our other ethical responsibilities in accordance with these requirements.

Key audit matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements for the year ended October 31, 2019. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Key audit matters

Valuation of the Allowance for Credit Losses (ACL)

Refer to Note 2, Summary of significant accounting policies, estimates and judgments, Note 4, Securities and Note 5, Loans and allowance for credit losses

The Bank's ACL for financial assets was \$3,440 million as at October 31, 2019, and represents management's estimate of expected credit losses on financial assets as at the balance sheet date. Performing financial assets are categorized as Stage 1 from initial recognition to the date on which the asset has experienced a significant increase in credit risk relative to its initial recognition. Performing financial assets transfer into Stage 2 following a significant increase in credit risk relative to the initial recognition. Impaired financial assets are categorized as Stage 3 when the asset is considered to be credit-impaired. As disclosed by management, the measurement of expected credit losses is a complex calculation that involves a large number of interrelated inputs and assumptions such as the financial asset's probability of default, loss given default, and exposure at default discounted at the reporting date.

Management's estimation of expected credit losses in Stage 1 and Stage 2 considers five distinct future macroeconomic scenarios, each of which includes forward-looking information designed to capture a wide range of possible outcomes and are weighted according to management's expectation of the relative likelihood of the range of outcomes that each scenario represents at the reporting date. Management's scenarios include a base case, upside and downside scenarios which are set by adjusting the base projections to construct reasonably

How our audit addressed the key audit matters

Our approach to addressing the matter involved the following procedures, amongst others:

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

possible scenarios that are more optimistic and pessimistic, respectively, than the base case. Two additional downside scenarios are designed for the real estate and energy sectors to capture the non-linear nature of potential credit losses across the Bank's portfolios of financial assets.

We determined that the valuation of the ACL is a matter of most significance to the audit of the current year consolidated financial statements due to:

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

Goodwill Impairment Assessment of the Caribbean Banking Cash Generating Unit (CGU)

Refer to Note 2, Summary of significant accounting policies, estimates and judgments, and Note 10, Goodwill and other intangible assets

The goodwill allocated to the Caribbean Banking CGU was \$1,727 million. Management conducts an impairment test as of August 1 of each year by comparing the carrying value of each CGU to its recoverable amount.

For the Caribbean Banking CGU, management calculated the recoverable amount as the fair value less costs of disposal using a discounted cash flow model that projects future cash flows based on management forecasts, adjusted to approximate the considerations of a prospective third-party buyer, over a 5-year period. Cash flows beyond the initial 5-year period are assumed by management to increase at a constant rate using a nominal long-term growth rate. As disclosed by management, the Caribbean continued to experience challenges in various regions resulting in weak to moderate economic growth during the year. As at August 1, 2019, the recoverable amount of the Caribbean Banking CGU, based on management's estimated fair value less costs of disposal, was 126% of its carrying amount. As management has disclosed, the determination of fair value using a discounted cash flow model requires the use of significant judgment to determine the inputs and the model is most sensitive to changes in future cash flows, discount rates, and terminal growth rates applied to cash flows beyond the forecast period. If the post-tax discount rate was increased by 1.8%, holding other individual factors constant, the recoverable amount would approximate the carrying amount.

We determined that the goodwill impairment assessment of the Caribbean Banking CGU is a matter of most significance to the audit of the current year consolidated financial statements due to:

- significant judgment required by management when determining the fair value of the CGU including future cash flows and adjustments made thereto to approximate the considerations of a prospective third-party buyer, discount rates and terminal growth rates. This in turn led to a high degree of auditor judgment and subjectivity in performing procedures over management's calculation of the recoverable amount of the CGU, and evaluating audit evidence; and
- the audit effort included the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Our approach to addressing the matter involved the following procedures, amongst others:

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

Uncertain Tax Positions

Refer to Note 2, Summary of significant accounting policies, estimates and judgments, and Note 23, Income taxes

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

We determined that uncertain tax positions are a matter of most significance to the audit of the current year consolidated financial statements due to:

- significant judgment required by management, including a high degree of estimation uncertainty, when interpreting the relevant tax laws and projecting the amount of future cash flows relating to uncertain tax positions. This in turn led to a high degree of auditor judgment and subjectivity in performing procedures to evaluate the uncertain tax positions; and
- the audit effort included the use of professionals with specialized skill and knowledge to assist in evaluating the audit evidence obtained.

Other information

Management is responsible for the other information. The other information comprises the Management's Discussion and Analysis and the information, other than the consolidated financial statements and our auditor's report thereon, included in the annual report.

Our opinion on the consolidated financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the consolidated financial statements, our responsibility is to read the other information identified above and, in doing so, consider whether the other information is materially inconsistent with the consolidated financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated.

If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of management and those charged with governance for the consolidated financial statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with IFRS, and for such internal control as management determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Bank's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Bank or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Bank's financial reporting process.

Auditor's responsibilities for the audit of the consolidated financial statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

Our approach to addressing the matter involved the following procedures, amongst others:

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

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Bank's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Bank's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Bank to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Bank to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

PricewaterhouseCoopers LLP

Chartered Professional Accountants, Licensed Public Accountants

Toronto, Canada
December 3, 2019

To the Shareholders and Board of Directors of Royal Bank of Canada

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Royal Bank of Canada and its subsidiaries (together, the Bank) as of October 31, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in equity and cash flows for the years then ended, including the related notes (collectively referred to as the consolidated financial statements). We also have audited the Bank's internal control over financial reporting as of October 31, 2019, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Bank as of October 31, 2019 and 2018, and its financial performance and its cash flows for the years then ended in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board (IFRS). Also in our opinion, the Bank maintained, in all material respects, effective internal control over financial reporting as of October 31, 2019, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Bank's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express opinions on the Bank's consolidated financial statements and on the Bank's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Bank in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

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

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

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Valuation of the Allowance for Credit Losses (ACL)

As described in Notes 2, 4 and 5 to the consolidated financial statements, the Bank's ACL for financial assets was \$3,440 million as at October 31, 2019, and represents management's estimate of expected credit losses on financial assets as at the balance sheet date. Performing financial assets are categorized as Stage 1 from initial recognition to the date on which the asset has experienced a significant increase in credit risk relative to its initial recognition. Performing financial assets transfer into Stage 2 following a significant increase in credit risk relative to the initial recognition. Impaired financial assets are categorized as Stage 3 when the asset is considered to be credit-impaired. As disclosed by management, the measurement of expected credit losses is a complex calculation that involves a large number of interrelated inputs and assumptions such as the financial asset's probability of default, loss given default, and exposure at default discounted at the reporting date. Management's estimation of expected credit losses in Stage 1 and Stage 2 considers five distinct future macroeconomic scenarios, each of which includes forward-looking information designed to capture a wide range of possible outcomes and are weighted according to

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

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

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

Goodwill Impairment Assessment of the Caribbean Banking Cash Generating Unit (CGU)

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

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

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

Uncertain Tax Positions

As described in Note 2 to the consolidated financial statements, the Bank is subject to income tax laws in various jurisdictions where it operates and the complex tax laws are potentially subject to different interpretations by management and relevant taxation authorities. In some cases, as described in Note 23, the Bank has received reassessments denying the tax deductibility of dividends from transactions including those with Tax Indifferent Investors. As disclosed by management, significant judgment is required in the interpretation of the relevant tax laws, and the determination of the Bank's tax provision, which includes management's best estimate of tax positions that are under audit or appeal by relevant taxation authorities. The forward-looking nature of these estimates requires management to use a significant amount of judgment in projecting the timing and amount of future cash flows. As management has further disclosed, management records provisions related to uncertain tax positions on the basis of all available information at the end of the reporting period to reflect current expectations.

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

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

PricewaterhouseCoopers LLP

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

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

Consolidated Balance Sheets

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

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

David I. McKay
President and Chief Executive Officer

David F. Denison
Director

Consolidated Statements of Income

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

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

Consolidated Statements of Comprehensive Income

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

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

Consolidated Statements of Changes in Equity

	For the year ended October 31, 2019											
	Other components of equity											
	Preferred shares	Common shares	Treasury shares – preferred	Treasury shares – common	Retained earnings	FVOCI securities and loans	Foreign currency translation	Cash flow hedges	Total other components of equity	Equity attributable to shareholders	Non-controlling interests	Total equity
(Millions of Canadian dollars)												
Balance at beginning of period	\$ 6,306	\$ 17,635	\$ 3	\$ (18)	\$ 51,112	\$ (12)	\$ 4,147	\$ 688	\$ 4,823	\$ 79,861	\$ 94	\$ 79,955
Transition adjustment (Note 2)	–	–	–	–	(94)	–	–	–	–	(94)	–	(94)
Adjusted balance at beginning of period	\$ 6,306	\$ 17,635	\$ 3	\$ (18)	\$ 51,018	\$ (12)	\$ 4,147	\$ 688	\$ 4,823	\$ 79,767	\$ 94	\$ 79,861
Changes in equity												
Issues of share capital	350	136	–	–	–	–	–	–	–	486	–	486
Common shares purchased for cancellation	–	(126)	–	–	(904)	–	–	–	–	(1,030)	–	(1,030)
Redemption of preferred shares	(950)	–	–	–	–	–	–	–	–	(950)	–	(950)
Sales of treasury shares	–	–	182	5,340	–	–	–	–	–	5,522	–	5,522
Purchases of treasury shares	–	–	(184)	(5,380)	–	–	–	–	–	(5,564)	–	(5,564)
Share-based compensation awards	–	–	–	–	(23)	–	–	–	–	(23)	–	(23)
Dividends on common shares	–	–	–	–	(5,840)	–	–	–	–	(5,840)	–	(5,840)
Dividends on preferred shares and other	–	–	–	–	(269)	–	–	–	–	(269)	(2)	(271)
Other	–	–	–	–	5	–	–	–	–	5	–	5
Net income	–	–	–	–	12,860	–	–	–	–	12,860	11	12,871
Total other comprehensive income (loss), net of taxes	–	–	–	–	(866)	45	74	(694)	(575)	(1,441)	(1)	(1,442)
Balance at end of period	\$ 5,706	\$ 17,645	\$ 1	\$ (58)	\$ 55,981	\$ 33	\$ 4,221	\$ (6)	\$ 4,248	\$ 83,523	\$ 102	\$ 83,625

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

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

Consolidated Statements of Cash Flows

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

(1) We are required to maintain balances with central banks and other regulatory authorities. The total balances were \$2.6 billion as at October 31, 2019 (October 31, 2018 – \$2.4 billion; October 31, 2017 – \$2.3 billion).

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

Note 1 General information

Royal Bank of Canada and its subsidiaries (the Bank) provide diversified financial services including Personal and Commercial Banking, Wealth Management, Insurance, Investor and Treasury Services and Capital Markets products and services on a global basis. Refer to Note 28 for further details on our business segments.

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

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

On December 3, 2019, the Board of Directors authorized the Consolidated Financial Statements for issue.

Note 2 Summary of significant accounting policies, estimates and judgments

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

General

Use of estimates and assumptions

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

Significant judgments

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

Consolidation of structured entities	Note 2 Note 7	Application of the effective interest method	Note 2
Fair value of financial instruments	Note 2 Note 3	Derecognition of financial assets	Note 2 Note 6
Allowance for credit losses	Note 2 Note 4 Note 5	Income taxes	Note 2 Note 23
Employee benefits	Note 2 Note 17	Provisions	Note 2 Note 25 Note 26
Goodwill and other intangibles	Note 2 Note 10		

Basis of consolidation

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

Consolidation

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

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

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

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

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

Investments in joint ventures and associates

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

Non-current assets held for sale and discontinued operations

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

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

Changes in accounting policies

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

Financial Instruments

Classification of financial assets

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

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

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

All other debt instruments are measured at FVTPL.

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

Business model assessment

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

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

⁽¹⁾ Revised from the amount previously presented.

- The compensation structures for managers of our businesses, to the extent that these are directly linked to the economic performance of the business model.

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

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

SPPI assessment

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

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

Securities

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

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

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

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

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

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

Fair value option

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

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

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

Determination of fair value

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

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

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

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

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

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

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

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

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

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

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

date. The availability of inputs for valuation may affect the selection of valuation techniques. The classification of a financial instrument in the hierarchy for disclosure purposes is based upon the lowest level of input that is significant to the measurement of fair value.

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

Loans

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

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

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

Allowance for credit losses

An allowance for credit losses (ACL) is established for all financial assets, except for financial assets classified or designated as FVTPL and equity securities designated as FVOCI, which are not subject to impairment assessment. Assets subject to impairment assessment include loans, debt securities, interest-bearing deposits with banks, customers' liability under acceptances, accounts and accrued interest receivable, and finance and operating lease receivables. ACL on loans measured at amortized cost is presented in Allowance for loan losses. ACL on debt securities measured at FVOCI is presented in Other components of equity. Other financial assets carried at amortized cost are presented net of ACL on our Consolidated Balance Sheets.

Off-balance sheet items subject to impairment assessment include financial guarantees and undrawn loan commitments. ACL on off-balance sheet items is separately calculated and included in Other Liabilities – Provisions.

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

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

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

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

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

Measurement of expected credit losses

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

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

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

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

Expected life

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

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

Assessment of significant increase in credit risk

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

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

- (1) We have established thresholds for significant increases in credit risk based on both a percentage and absolute change in lifetime PD relative to initial recognition. For our wholesale portfolio, a decrease in the borrower's risk rating is also required to determine that credit risk has increased significantly.
- (2) Additional qualitative reviews are performed to assess the staging results and make adjustments, as necessary, to better reflect the positions whose credit risk has increased significantly.
- (3) Instruments which are 30 days past due are generally considered to have experienced a significant increase in credit risk, even if our other metrics do not indicate that a significant increase in credit risk has occurred.

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

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

Use of forward-looking information

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

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

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

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

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

Definition of default

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

Credit-impaired financial assets (Stage 3)

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

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

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

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

Individually assessed loans (Stage 3)

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

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

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

Collectively assessed loans (Stage 3)

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

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

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

Write-off of loans

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

Modifications

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

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

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

Derivatives

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

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

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

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

Derecognition of financial assets

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

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

Derecognition of financial liabilities

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

Interest

Interest is recognized in Interest income and Interest expense in the Consolidated Statements of Income for all interest-bearing financial instruments. The effective interest rate is the rate that discounts estimated future cash flows over the expected life of

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

Dividend income

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

Transaction costs

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

Offsetting financial assets and financial liabilities

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

Assets purchased under reverse repurchase agreements and sold under repurchase agreements

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

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

Hedge accounting

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

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

Fair value hedges

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

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

Cash flow hedges

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

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

Net investment hedges

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

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

Guarantees

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

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

Insurance and segregated funds

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

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

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

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

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

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

Employee benefits – Pensions and other post-employment benefits

Our defined benefit pension expense, which is included in Non-interest expense – Human resources, consists of the cost of employee pension benefits for the current year's service, net interest on the net defined benefit liability (asset), past service cost and gains or losses on settlement. Remeasurements of the net defined benefit obligation, which comprise actuarial gains and losses and return on plan assets (excluding amounts included in net interest on the net defined benefit liability), are recognized immediately in OCI in the period in which they occur. Actuarial gains and losses comprise experience adjustments (the effects of differences between the previous actuarial assumptions and what has actually occurred), as well as the effects of changes in

actuarial assumptions. Amounts recognized in OCI will not be reclassified subsequently to net income. Past service cost is the change in the present value of the defined benefit obligation resulting from a plan amendment or curtailment and is charged immediately to income.

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

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

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

Share-based compensation

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

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

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

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

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

Income taxes

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

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

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

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

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

Business combinations, goodwill and other intangibles

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

Goodwill

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

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

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

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

Other intangibles

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

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

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

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

Other

Translation of foreign currencies

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

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

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

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

Premises and equipment

Premises and equipment includes land, buildings, leasehold improvements, computer equipment, furniture, fixtures and other equipment, and are stated at cost less accumulated depreciation, except for land which is not depreciated, and accumulated impairment losses. Cost comprises the purchase price, any costs directly attributable to bringing the asset to the location and condition necessary for its intended use, and the initial estimate of any disposal costs. Depreciation is recorded principally on a straight-line basis over the estimated useful lives of the assets, which are 25 to 50 years for buildings, 3 to 10 years for computer equipment, and 5 to 10 years for furniture, fixtures and other equipment. The amortization period for leasehold improvements is the lesser of the useful life of the leasehold improvements or the lease term plus the first renewal period, if reasonably assured of renewal, up to a maximum of 10 years. Depreciation methods, useful lives, and residual values are reassessed at each reporting period and adjusted as appropriate. Gains and losses on disposal are recorded in Non-interest income.

Premises and equipment are assessed for indicators of impairment at each reporting period. If there is an indication that an asset may be impaired, an impairment test is performed by comparing the asset's carrying amount to its recoverable amount.

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

Provisions

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

We are required to estimate the results of ongoing legal proceedings, tax positions that are under audit or appeal by relevant taxation authorities, and expenses to be incurred to dispose of capital assets. The forward-looking nature of these estimates requires us to use a significant amount of judgment in projecting the timing and amount of future cash flows. We record our provisions on the basis of all available information at the end of the reporting period and make adjustments on a quarterly basis to reflect current expectations. It may not be possible to predict the resolution of these matters or the timing of their ultimate resolution. Should actual results differ from our expectations, we may incur expenses in excess of the provisions recognized. Where appropriate, we apply judgment in limiting the extent of our provisions-related disclosures as not to prejudice our positions in matters of dispute.

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

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

Commissions and fees primarily relate to Investment management and custodial fees, Mutual fund revenue, Securities brokerage commissions, Services charges, Underwriting and other advisory fees, Card service revenue and Credit fees, and are recognized based on the applicable service contracts with customers.

Investment management and custodial fees and Mutual fund revenue are generally calculated as a percentage of daily or period-end net asset values (NAV) based on the terms of the contract with customers and are received monthly, quarterly, semiannually or annually, depending on the terms of the contract. Investment management and custodial fees are generally derived from assets under management (AUM) when our clients solicit the investment capabilities of an investment manager or from assets under administration (AUA) where the investment strategy is directed by the client or a designated third party manager. Mutual fund revenue is derived from the daily NAV of the mutual funds. Investment management and custodial fees and Mutual fund revenue are recognized over time when the service is provided to the customer, provided that it is highly probable that a significant reversal in the amount of revenue recognized will not occur.

Commissions earned on Securities brokerage services and Service charges that are related to the provision of specific transaction-type services are recognized when the service is fulfilled. Where services are provided over time, revenue is recognized as the services are provided.

Underwriting and other advisory fees primarily relate to underwriting of new issuances of debt or equity and various advisory services. Underwriting fees are generally expressed as a percentage of the funds raised through issuance and are recognized when the service has been completed. Advisory fees vary depending on the scope and type of engagement and can be fixed in nature or contingent on a future event. Advisory fees are recognized over the period in which the service is provided and are recognized only to the extent that it is highly probable that a significant reversal in the amount of revenue will not occur.

Card service revenue primarily includes interchange revenue and annual card fees. Interchange revenue is calculated as a fixed percentage of the transaction amount and recognized when the card transaction is settled. Annual card fees are fixed fees and are recognized over a 12 month period.

Credit fees are primarily earned for arranging syndicated loans and making credit available on undrawn facilities. The timing of the recognition of credit fees varies based on the nature of the services provided.

When service fees and other costs are incurred in relation to commissions and fees earned, we record these costs on a gross basis in either Non-interest expense – Other or Non-interest expense – Human resources based on our assessment of whether we have primary responsibility to fulfill the contract with the customer and have discretion in establishing the price for the commissions and fees earned, which may require judgment.

Commissions and fees – Policies applicable prior to November 1, 2018 (IAS 18 – Revenue)

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

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

Leasing

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

Operating leases

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

Finance leases

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

Earnings per share

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

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

Share capital

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

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

Future changes in accounting policy and disclosure

The following standards have been issued, but are not yet effective for us.

IFRS 16 Leases (IFRS 16)

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

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

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

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

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

IFRS Interpretations Committee Interpretation 23 *Uncertainty over income tax treatments* (IFRIC 23)

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

Interest Rate Benchmark Reform

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

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

Conceptual Framework for Financial Reporting (Conceptual Framework)

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

IFRS 17 Insurance Contracts (IFRS 17)

In May 2017, the IASB issued IFRS 17 to establish a comprehensive global insurance standard which provides guidance on the recognition, measurement, presentation and disclosures of insurance contracts. IFRS 17 requires entities to measure insurance contract liabilities at their current fulfillment values using one of three approaches. This new standard will be effective for us on November 1, 2021 and will be applied retrospectively with restatement of comparatives unless impracticable. In June 2019, the IASB issued an exposure draft to amend IFRS 17, including deferral of the effective date by one year. We will continue to monitor the IASB's developments. We are currently assessing the impact of adopting this standard and the proposed amendments on our Consolidated Financial Statements.

Note 3 Fair value of financial instruments

Carrying value and fair value of financial instruments

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

	As at October 31, 2019							
	Carrying value and fair value				Carrying value		Fair value	
	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
(Millions of Canadian dollars)								
Financial assets								
Interest-bearing deposits with banks	\$ –	\$ 22,283	\$ –	\$ –	\$ 16,062	\$ 16,062	\$ 38,345	\$ 38,345
Securities								
Trading	137,600	8,934	–	–	–	–	146,534	146,534
Investment, net of applicable allowance	–	–	57,223	463	44,784	45,104	102,470	102,790
	137,600	8,934	57,223	463	44,784	45,104	249,004	249,324
Assets purchased under reverse repurchase agreements and securities borrowed	246,068	–	–	–	60,893	60,894	306,961	306,962
Loans, net of applicable allowance								
Retail	275	242	95	–	423,469	424,416	424,081	425,028
Wholesale	7,055	1,856	451	–	185,413	184,645	194,775	194,007
	7,330	2,098	546	–	608,882	609,061	618,856	619,035
Other								
Derivatives	101,560	–	–	–	–	–	101,560	101,560
Other assets (1)	3,156	–	–	–	50,375	50,375	53,531	53,531
Financial liabilities								
Deposits								
Personal	\$ 140	\$ 17,394			\$ 277,198	\$ 277,353	\$ 294,732	\$ 294,887
Business and government (2)	151	111,389			453,942	452,536	565,482	564,076
Bank (3)	–	3,032			22,759	22,773	25,791	25,805
	291	131,815			753,899	752,662	886,005	884,768
Other								
Obligations related to securities sold short	35,069	–			–	–	35,069	35,069
Obligations related to assets sold under repurchase agreements and securities loaned	–	218,612			7,974	7,974	226,586	226,586
Derivatives	98,543	–			–	–	98,543	98,543
Other liabilities (4)	(1,209)	91			61,039	61,024	59,921	59,906
Subordinated debentures	–	–			9,815	9,930	9,815	9,930

Note 3 Fair value of financial instruments (continued)

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

(1) Includes Customers' liability under acceptances and financial instruments recognized in Other assets.

(2) Business and government deposits include deposits from regulated deposit-taking institutions other than banks.

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

(4) Bank deposits refer to deposits from regulated banks and central banks.

(5) Includes Acceptances and financial instruments recognized in Other liabilities.

Financial assets designated as fair value through profit or loss

For our financial assets designated as FVTPL, we measure the change in fair value attributable to changes in credit risk as the difference between the total change in the fair value of the instrument during the period and the change in fair value calculated using the appropriate risk-free yield curves. For the years ended October 31, 2019 and October 31, 2018, there were no significant changes in the fair value of the loans and receivables designated as FVTPL attributable to changes in credit risk. As at October 31, 2019, the extent to which credit derivatives or similar instruments mitigate the maximum exposure to credit risk was \$514 million (October 31, 2018 – \$nil).

Financial liabilities designated as fair value through profit or loss

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

(Millions of Canadian dollars)	As at or for the year ended October 31, 2019 (1)					
	Contractual maturity amount	Carrying value	Difference between carrying value and contractual maturity amount	Changes in fair value attributable to changes in credit risk included in OCI for positions still held		
				During the period	Cumulative (2)	
Term deposits						
Personal	\$ 17,307	\$ 17,394	\$ 87	\$ 3	\$ 22	
Business and government (3)	110,763	111,389	626	(76)	210	
Bank (4)	3,031	3,032	1	-	-	
	131,101	131,815	714	(73)	232	
Obligations related to assets sold under repurchase agreements and securities loaned	218,604	218,612	8	-	-	
Other liabilities	91	91	-	-	-	
	\$ 349,796	\$ 350,518	\$ 722	\$ (73)	\$ 232	

(Millions of Canadian dollars)	As at or for the year ended October 31, 2018 (1)				
	Contractual maturity amount	Carrying value	Difference between carrying value and contractual maturity amount	Changes in fair value attributable to changes in credit risk included in OCI for positions still held	
				During the period	Cumulative (2)
Term deposits					
Personal	\$ 14,726	\$ 14,602	\$ (124)	\$ (41)	\$ 19
Business and government (3), (5)	102,640	102,597	(43)	(134)	285
Bank (4)	7,067	7,072	5	–	–
	124,433	124,271	(162)	(175)	304
Obligations related to assets sold under repurchase agreements and securities loaned	201,924	201,839	(85)	–	–
Other liabilities	18	18	–	–	–
	\$ 326,375	\$ 326,128	\$ (247)	\$ (175)	\$ 304

(1) There are no changes in fair value attributable to changes in credit risk included in net income for positions still held.

(2) The cumulative change is measured from the initial designation of the liabilities as FVTPL. For the year ended October 31, 2019, \$4 million of fair value losses previously included in OCI relate to financial liabilities derecognized during the year (October 31, 2018 – \$7 million fair value losses).

(3) Business and government term deposits include amounts from regulated deposit-taking institutions other than regulated banks.

(4) Bank term deposits refer to amounts from regulated banks and central banks.

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

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

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

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

(1) Excludes the following amounts related to our insurance operations and included in Insurance premiums, investment and fee income in the Consolidated Statements of Income: Net gains from financial instruments designated as FVTPL of \$1,303 million (October 31, 2018 – losses of \$400 million).

(2) Excludes derivatives designated in a hedging relationship. Refer to Note 8 for net gains (losses) on these derivatives.

(3) For the year ended October 31, 2019, \$1,810 million of net fair value losses on financial liabilities designated as FVTPL, other than those attributable to changes in our own credit risk, were included in Non-interest income (October 31, 2018 – gains of \$2,052 million).

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

(5) Includes gains (losses) recognized on cross currency interest rate swaps.

Net interest income from financial instruments

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

(Millions of Canadian dollars)	For the year ended	
	October 31 2019	October 31 2018 (1)
Interest and dividend income (2), (3)		
Financial instruments measured at fair value through profit or loss (4)	\$ 12,103	\$ 7,800
Financial instruments measured at fair value through other comprehensive income	1,132	802
Financial instruments measured at amortized cost	28,098	24,419
	41,333	33,021
Interest expense (2)		
Financial instruments measured at fair value through profit or loss (4)	\$ 10,507	\$ 6,542
Financial instruments measured at amortized cost	11,077	8,527
	21,584	15,069
Net interest income	\$ 19,749	\$ 17,952

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

(2) Excludes the following amounts related to our insurance operations and included in Insurance premiums, investment and fee income in the Consolidated Statements of Income: Interest income of \$486 million (October 31, 2018 – \$479 million), and Interest expense of \$4 million (October 31, 2018 – \$4 million).

(3) Includes dividend income for the year ended October 31, 2019 of \$2,057 million (October 31, 2018 – \$1,561 million), which is presented in Interest and dividend income in the Consolidated Statements of Income.

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

Fee income arising from financial instruments

For the year ended October 31, 2019, we earned \$5,270 million in fees from banking services (October 31, 2018 – \$5,426 million). For the year ended October 31, 2019, we also earned \$12,117 million in fees from investment management, trust, custodial, underwriting, brokerage and other similar fiduciary services to retail and institutional clients (October 31, 2018 – \$11,944 million). These fees are included in Non-interest income.

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

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

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

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

Interest-bearing deposits with banks

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

Government bonds (Canadian, U.S. and other OECD governments)

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

Corporate and U.S. municipal bonds

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

Asset-backed securities and Mortgage-backed securities

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

Equities

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

Loans

Loans include base metal loans, corporate loans, banker acceptances and asset-backed financing loans. Fair values are determined based on market prices, if available, or discounted cash flow method using the following inputs: market interest rates, base metal commodity prices, market based spreads of assets with similar credit ratings and terms to maturity, LGD, expected default frequency implied from credit derivative prices, if available, and relevant pricing information such as contractual rate, origination and maturity dates, redemption price, coupon payment frequency and day count convention. Loans with market prices or observable inputs are classified as Level 2 in the hierarchy and loans with unobservable inputs that have significant impacts on the fair values are classified as Level 3 in the hierarchy.

Derivatives

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

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

Deposits

A majority of our deposits are measured at amortized cost but certain deposits are designated as FVTPL. These FVTPL deposits include deposits taken from clients, issuances of certificates of deposits and promissory notes, and interest rate and equity linked notes. The fair values of these instruments are determined using the discounted cash flow method and derivative option valuation models. The inputs to the valuation models include benchmark yield curves, credit spreads, interest rates, equity and interest rate volatility, dividends and correlation, where applicable. They are classified as Level 2 or 3 instruments in the hierarchy, depending on the significance of the unobservable credit spreads, volatility, dividend and correlation rates.

Quantitative information about fair value measurements using significant unobservable inputs (Level 3 Instruments)

The following table presents fair values of our significant Level 3 financial instruments, valuation techniques used to determine their fair values, ranges and weighted averages of unobservable inputs.

As at October 31, 2019 (Millions of Canadian dollars, except for prices, percentages and ratios)

Products	Reporting line in the fair value hierarchy table	Fair value		Valuation techniques	Significant unobservable inputs (3)	Range of input values (1), (2)		
		Assets	Liabilities			Low	High	Weighted average / Inputs distribution
Non-derivative financial instruments								
Auction rate securities	U.S. state, municipal and agencies debt	58		Discounted cash flows	Discount margins	1.60%	3.00%	1.65%
	Asset-backed securities	2			Default rates	3.00%	3.00%	3.00%
					Prepayment rates	8.00%	8.00%	8.00%
					Recovery rates	96.50%	96.50%	96.50%
Corporate debt	Corporate debt and other debt	24		Price-based	Prices	\$ 20.00	\$131.78	\$ 110.30
	Loans	680		Discounted cash flows	Credit spread	1.02%	11.34%	6.18%
					Credit enhancement	11.82%	15.75%	13.13%
Government debt and municipal bonds	U.S. state, municipal and agencies debt	–		Price-based	Prices	\$ 65.50	\$100.00	\$ 65.67
	Mortgage-backed securities	27		Discounted cash flows	Yields	4.70%	6.63%	5.80%
	Corporate debt and other debt	150						
Private equities, hedge fund investments and related equity derivatives	Equities	1,513		Market comparable	EV/EBITDA multiples	4.00X	24.90X	10.23X
	Derivative related liabilities		10	Price-based	P/E multiples	9.70X	29.90X	16.11X
				Discounted cash flows	EV/Rev multiples	0.90X	5.93X	3.55X
					Liquidity discounts (4)	10.00%	40.00%	17.64%
					Discount rate	10.00%	12.00%	10.45%
					NAV / prices (5)	n.a.	n.a.	n.a.
Derivative financial instruments (6)								
Interest rate derivatives and interest-rate-linked structured notes (7)	Derivative related assets	380		Discounted cash flows	Interest rates	1.27%	2.16%	Even
	Derivative related liabilities		943	Option pricing model	CPI swap rates	1.40%	2.00%	Even
					IR-IR correlations	19.00%	67.00%	Even
					FX-IR correlations	29.00%	56.00%	Even
					FX-FX correlations	68.00%	68.00%	Even
Equity derivatives and equity-linked structured notes (7)	Derivative related assets	11		Discounted cash flows	Dividend yields	0.10%	8.77%	Lower
	Deposits		156	Option pricing model	Equity (EQ)-EQ correlations	34.00%	95.40%	Middle
	Derivative related liabilities		180		EQ-FX correlations	(71.40)%	30.50%	Middle
					EQ volatilities	4.00%	110.00%	Upper
Other (8)								
	Derivative related assets	32						
	Other assets	77						
	Deposits		–					
	Derivative related liabilities		27					
	Other liabilities		60					
Total		\$ 2,954	\$ 1,376					

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

Products	Reporting line in the fair value hierarchy table	Fair value		Valuation techniques	Significant unobservable inputs (3)	Range of input values (1), (2)		
		Assets	Liabilities			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%
	Mortgage-backed securities	-						
	Corporate debt and other debt	185						
Private equities, hedge fund investments and related equity derivatives				Market comparable	EV/EBITDA multiples	6.16X	17.80X	14.46X
	Equities	1,385		Price-based	P/E multiples	9.10X	26.41X	18.26X
	Derivative related liabilities		24	Discounted cash flows	EV/Rev multiples	0.90X	6.63X	4.86X
					Liquidity discounts (4)	10.00%	40.00%	18.27%
					Discount rate	10.52%	10.52%	10.52%
					NAV / prices (5)	n.a.	n.a.	n.a.
Derivative financial instruments (6)								
Interest rate derivatives and interest-rate-linked structured notes (7)	Derivative related assets	260		Discounted cash flows	Interest rates	2.30%	3.00%	Even
	Derivative related liabilities		740	Option pricing model	CPI swap rates	1.90%	2.10%	Even
					IR-IR correlations	19.00%	67.00%	Even
					FX-IR correlations	29.00%	56.00%	Even
					FX-FX correlations	68.00%	68.00%	Even
Equity derivatives and equity-linked structured notes (7)				Discounted cash flows	Dividend yields	0.30%	8.40%	Lower
	Derivative related assets	281		Option pricing model	Equity (EQ)-EQ correlations	(55.00)%	100.00%	Middle
	Deposits		390		EQ-FX correlations	(71.40)%	30.50%	Middle
	Derivative related liabilities		328		EQ volatilities	8.00%	164.00%	Upper
Other (8)								
	Derivative related assets	36						
	Other assets	65						
	Deposits		(5)					
	Derivative related liabilities		51					
	Other liabilities		68					
Total		\$ 2,967	\$ 1,596					

- (1) The low and high input values represent the actual highest and lowest level inputs used to value a group of financial instruments in a particular product category. These input ranges do not reflect the level of input uncertainty, but are affected by the different underlying instruments within the product category. The input ranges will therefore vary from period to period based on the characteristics of the underlying instruments held at each balance sheet date. Where provided, the weighted average of the input values is calculated based on the relative fair values of the instruments within the product category. The weighted averages for derivatives are not presented in the table as they would not provide a comparable metric; instead, distribution of significant unobservable inputs within the range for each product category is indicated in the table.
- (2) Price-based inputs are significant for certain debt securities and are based on external benchmarks, comparable proxy instruments or pre-quarter-end trade data. For these instruments, the price input is expressed in dollars for each \$100 par value. For example, with an input price of \$105, an instrument is valued at a premium over its par value.
- (3) The acronyms stand for the following: (i) Enterprise Value (EV); (ii) Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA); (iii) Price / Earnings (P/E); (iv) Revenue (Rev); (v) Consumer Price Index (CPI); (vi) Interest Rate (IR); (vii) Foreign Exchange (FX); and (viii) Equity (EQ).
- (4) Fair value of securities with liquidity discount inputs totalled \$255 million (October 31, 2018 – \$207 million).
- (5) NAV of a hedge fund is total fair value of assets less liabilities divided by the number of fund units. Private equities are valued based on NAV or valuation techniques. The range for NAV per unit or price per share has not been disclosed for the hedge funds or private equities due to the dispersion of prices given the diverse nature of the investments.
- (6) The level of aggregation and diversity within each derivative instrument category may result in certain ranges of inputs being wide and inputs being unevenly distributed across the range. In the table, we indicated whether the majority of the inputs are concentrated toward the upper, middle, or lower end of the range, or evenly distributed throughout the range.
- (7) The structured notes contain embedded equity or interest rate derivatives with unobservable inputs that are similar to those of the equity or interest rate derivatives.
- (8) Other primarily includes certain insignificant instruments such as commodity derivatives, foreign exchange derivatives, contingent considerations, bank-owned life insurance and retractable shares.
- n.a. not applicable

Sensitivity to unobservable inputs and interrelationships between unobservable inputs

Yield, credit spreads/discount margins

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

Funding spread

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

Default rates

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

Prepayment rates

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

Recovery and loss severity rates

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

Volatility rates

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

Dividend yields

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

Correlation rates

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

Interest rates

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

Consumer Price Index swap rates

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

EV/EBITDA multiples, P/E multiples, EV/Rev multiples, and liquidity discounts

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

Credit Enhancement

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

Interrelationships between unobservable inputs

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

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

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

Note 3 Fair value of financial instruments (continued)

For the year ended October 31, 2018

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

(1) These amounts include the foreign currency translation gains or losses arising on consolidation of foreign subsidiaries relating to the Level 3 instruments, where applicable. The unrealized gains on Investment securities recognized in OCI were \$43 million for the year ended October 31, 2019 (October 31, 2018 – gains of \$33 million) excluding the translation gains or losses arising on consolidation.

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

(3) Net derivatives as at October 31, 2019 included derivative assets of \$423 million (October 31, 2018 – \$577 million) and derivative liabilities of \$1,160 million (October 31, 2018 – \$1,143 million).

n.a. not applicable

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

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

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

During the year ended October 31, 2019, transfers out of Level 1 to Level 2 included Other contracts, consisting of derivative related assets and derivative related liabilities of \$1,996 million and \$621 million, respectively and Trading U.S. state, municipal and agencies debt of \$1,250 million and Obligations related to securities sold short of \$202 million. During the year ended October 31, 2018, transfers out of Level 1 to Level 2 included \$529 million of Trading U.S. state, municipal and agencies debt and \$809 million of Obligations related to securities sold short.

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

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

During the year ended October 31, 2019, significant transfers out of Level 2 to Level 3 included \$214 million of Personal deposits, due to changes in the significance of unobservable inputs.

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

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

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

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

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

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

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

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

(Millions of Canadian dollars)	As at					
	October 31, 2019			October 31, 2018		
	Level 3 fair value	Positive fair value movement from using reasonably possible alternatives	Negative fair value movement from using reasonably possible alternatives	Level 3 fair value	Positive fair value movement from using reasonably possible alternatives	Negative fair value movement from using reasonably possible alternatives
Securities						
Trading						
Debt issued or guaranteed by:						
U.S. state, municipal and agencies	\$ 58	\$ 1	\$ (1)	\$ 66	\$ –	\$ (1)
Asset-backed securities	2	–	–	110	7	(10)
Corporate debt and other debt	21	–	–	21	–	–
Equities	1,219	13	(14)	1,148	12	(12)
Investment						
Mortgage-backed securities	27	1	(1)	–	–	–
Corporate debt and other debt	153	15	(13)	192	19	(16)
Equities	294	26	(27)	237	24	(26)
Loans	680	9	(12)	551	5	(7)
Derivatives	423	6	(3)	577	20	(18)
Other assets	77	–	–	65	–	–
	\$ 2,954	\$ 71	\$ (71)	\$ 2,967	\$ 87	\$ (90)
Deposits	\$ (156)	\$ 4	\$ (4)	\$ (385)	\$ 12	\$ (11)
Derivatives	(1,160)	20	(17)	(1,143)	47	(54)
Other						
Other liabilities	(60)	–	–	(68)	–	–
	\$ (1,376)	\$ 24	\$ (21)	\$ (1,596)	\$ 59	\$ (65)

Sensitivity results

As at October 31, 2019, the effects of applying other reasonably possible alternative assumptions to the Level 3 asset positions would be an increase of \$71 million and a decrease of \$71 million in fair value, of which \$43 million and \$42 million would be recorded in Other components of equity, respectively. The effects of applying these assumptions to the Level 3 liability positions would result in a decrease of \$24 million and an increase of \$21 million in fair value.

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

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

Financial assets or liabilities	Sensitivity methodology
Asset-backed securities, corporate debt, government debt, municipal bonds and loans	Sensitivities are determined based on adjusting, plus or minus one standard deviation, the bid-offer spreads or input prices if a sufficient number of prices is received, adjusting input parameters such as credit spreads or using high and low vendor prices as reasonably possible alternative assumptions.
Auction rate securities	Sensitivity of ARS is determined by decreasing the discount margin between 13% and 17% and increasing the discount margin between 27% and 31%, depending on the specific reasonable range of fair value uncertainty for each particular financial instrument's market. Changes to the discount margin reflect historical monthly movements in the student loan ABS market.
Private equities, hedge fund investments and related equity derivatives	Sensitivity of direct private equity investments is determined by (i) adjusting the discount rate by 2% when the discounted cash flow method is used to determine fair value, (ii) adjusting the price multiples based on the range of multiples of comparable companies when price-multiples-based models are used, or (iii) using an alternative valuation approach. The private equity fund, hedge fund and related equity derivative NAVs are provided by the fund managers, and as a result, there are no other reasonably possible alternative assumptions for these investments.
Interest rate derivatives	Sensitivities of interest rate and cross currency swaps are derived using plus or minus one standard deviation of the inputs, and an amount representing model and parameter uncertainty, where applicable.
Equity derivatives	Sensitivity of the Level 3 position is determined by shifting the unobservable model inputs by plus or minus one standard deviation of the pricing service market data including volatility, dividends or correlations, as applicable.
Bank funding and deposits	Sensitivities of deposits are calculated by shifting the funding curve by plus or minus certain basis points.
Structured notes	Sensitivities for interest-rate-linked and equity-linked structured notes are derived by adjusting inputs by plus or minus one standard deviation, and for other deposits, by estimating a reasonable move in the funding curve by plus or minus certain basis points.

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

	As at October 31, 2019						
	Fair value always approximates carrying value (1)	Fair value may not approximate carrying value				Total	Total fair value
		Fair value measurements using					
(Millions of Canadian dollars)		Level 1	Level 2	Level 3			
Interest-bearing deposits with banks	\$ 16,062	\$ –	\$ –	\$ –	\$ –	\$ 16,062	
Amortized cost securities (2)	–	523	44,581	–	45,104	45,104	
Assets purchased under reverse repurchase agreements and securities borrowed	48,784	–	12,110	–	12,110	60,894	
Loans							
Retail	66,647	–	352,717	5,052	357,769	424,416	
Wholesale	6,596	–	173,274	4,775	178,049	184,645	
	73,243	–	525,991	9,827	535,818	609,061	
Other assets	49,761	–	469	145	614	50,375	
	187,850	523	583,151	9,972	593,646	781,496	
Deposits							
Personal	195,583	–	81,179	591	81,770	277,353	
Business and government	296,166	–	155,646	724	156,370	452,536	
Bank	15,093	–	7,671	9	7,680	22,773	
	506,842	–	244,496	1,324	245,820	752,662	
Obligations related to assets sold under repurchase agreements and securities loaned	7,974	–	–	–	–	7,974	
Other liabilities	50,601	–	445	9,978	10,423	61,024	
Subordinated debentures	8	–	9,864	58	9,922	9,930	
	\$ 565,425	\$ –	\$ 254,805	\$ 11,360	\$ 266,165	\$ 831,590	

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

(1) Certain financial instruments have not been assigned to a level as the carrying amount always approximates their fair values due to their short-term nature (instruments that are receivable or payable on demand, or with original maturity of three months or less) and insignificant credit risk.

(2) Included in Securities – Investment, net of applicable allowance on the Consolidated Balance Sheets.

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

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

Amortized cost securities

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

Assets purchased under reverse repurchase agreements and securities borrowed, and Obligations related to assets sold under repurchase agreements and securities loaned

Valuation methods used for the long-term instruments are described in the Fair value of assets and liabilities measured on a recurring basis and classified using the fair value hierarchy section of this note. The carrying values of short-term instruments generally approximate their fair values.

Loans – Retail

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

Loans – Wholesale

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

Deposits

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

Other assets and Other liabilities

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

Subordinated debentures

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

Carrying value of securities

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

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

(1) Actual maturities may differ from contractual maturities shown above as borrowers may have the right to extend or prepay obligations with or without penalties.

(2) Trading securities and FVOCI securities are recorded at fair value. Amortized cost securities, included in Investment securities, are recorded at amortized cost and presented net of allowance for credit losses.

(3) Primarily composed of corporate debt, supra-national debt, and commercial paper.

(4) The weighted average yield is derived using the contractual interest rate and the carrying value at the end of the year for the respective securities.

(5) Certain equity securities that are not held-for-trading purposes are designated as FVOCI. During the year ended October 31, 2019, we disposed of \$129 million of equity securities measured at FVOCI (October 31, 2018 – \$8 million). The cumulative gain on the date of disposals was \$1 million (October 31, 2018 – \$(1) million).

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

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

(1) Excludes \$44,784 million of held-to-collect securities as at October 31, 2019 that are carried at amortized cost, net of allowance for credit losses (October 31, 2018 – \$46,109 million).

(2) Gross unrealized gains and losses includes \$(3) million of allowance for credit losses on debt securities at FVOCI as at October 31, 2019 (October 31, 2018 – \$11 million) recognized in income and Other components of equity.

(3) The majority of the MBS are residential. Cost/Amortized cost, Gross unrealized gains, Gross unrealized losses and Fair value related to commercial MBS are \$2,051 million, \$1 million, \$6 million and \$2,046 million, respectively as at October 31, 2019 (October 31, 2018 – \$1,442 million, \$nil, \$6 million and \$1,436 million, respectively).

Allowance for credit losses on investment securities

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

Reconciling items include the following:

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

Allowance for credit losses – securities at FVOCI (1)

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

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

(2) Reflects changes in the allowance for purchased credit impaired securities.

Allowance for credit losses – securities at amortized cost

(Millions of Canadian dollars)	For the year ended							
	October 31, 2019				October 31, 2018			
	Performing		Impaired		Performing		Impaired	
	Stage 1	Stage 2	Stage 3	Total	Stage 1	Stage 2	Stage 3	Total
Balance at beginning of period	\$ 6	\$ 32	\$ –	\$ 38	\$ 9	\$ 45	\$ –	\$ 54
Provision for credit losses								
Transfers to stage 1	–	–	–	–	3	(3)	–	–
Transfers to stage 2	–	–	–	–	(7)	7	–	–
Transfers to stage 3	–	–	–	–	–	(2)	2	–
Purchases	7	–	–	7	5	–	–	5
Sales and maturities	(1)	–	–	(1)	(3)	(11)	–	(14)
Changes in risk, parameters and exposures	(6)	(15)	–	(21)	(2)	(3)	–	(5)
Write-offs	–	–	–	–	–	–	(2)	(2)
Exchange rate and other	(1)	2	–	1	1	(1)	–	–
Balance at end of period	\$ 5	\$ 19	\$ –	\$ 24	\$ 6	\$ 32	\$ –	\$ 38

Credit risk exposure by internal risk rating

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

(Millions of Canadian dollars)	As at							
	October 31, 2019				October 31, 2018			
	Performing		Impaired		Performing		Impaired	
	Stage 1	Stage 2	Stage 3 (1)	Total	Stage 1	Stage 2	Stage 3 (1)	Total
Investment securities								
Securities at FVOCI								
Investment grade	\$ 56,671	\$ 1	\$ –	\$ 56,672	\$ 46,956	\$ 479	\$ –	\$ 47,435
Non-investment grade	400	1	–	401	500	33	–	533
Impaired	–	–	150	150	–	–	125	125
	\$ 57,071	\$ 2	\$ 150	\$ 57,223	\$ 47,456	\$ 512	\$ 125	\$ 48,093
Items not subject to impairment (2)				463				406
				\$ 57,686				\$ 48,499
Securities at amortized cost								
Investment grade	\$ 43,681	\$ 46	\$ –	\$ 43,727	\$ 44,958	\$ 119	\$ –	\$ 45,077
Non-investment grade	695	386	–	1,081	367	703	–	1,070
Impaired	–	–	–	–	–	–	–	–
	\$ 44,376	\$ 432	\$ –	\$ 44,808	\$ 45,325	\$ 822	\$ –	\$ 46,147
Allowance for credit losses	5	19	–	24	6	32	–	38
Amortized cost	\$ 44,371	\$ 413	\$ –	\$ 44,784	\$ 45,319	\$ 790	\$ –	\$ 46,109

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

(2) Investment securities at FVOCI not subject to impairment represent equity securities designated as FVOCI.

Note 5 Loans and allowance for credit losses
Loans by geography and portfolio net of allowance

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

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

(1) Excludes allowance for loans measured at FVOCI of \$nil (October 31, 2018 – \$1 million).

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

(3) The credit cards business is managed as a single portfolio and includes both consumer and business cards.

(4) Includes small business exposure managed on a pooled basis.

(5) Includes small business exposure managed on an individual client basis.

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

Loans maturity and rate sensitivity

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

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

(1) Generally, based on the earlier of contractual repricing or maturity date.

(2) Includes variable rate loans that can be repriced at the clients' discretion without penalty.

Allowance for credit losses

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

(1) Loans written-off are generally subject to continued collection efforts for a period of time following write-off. The contractual amount outstanding on loans written-off during the year ended October 31, 2019 that are no longer subject to enforcement activity was \$179 million (October 31, 2018 – \$83 million).

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

Reconciling items include the following:

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

Allowance for credit losses – Retail and Wholesale loans

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

Key inputs and assumptions

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

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

Internal risk ratings

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

Forward looking macroeconomic variables

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

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

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

(1) Represents the average quarterly unemployment level over the period.

(2) Represents the average quarter-over-quarter gross domestic product annualized over the period.

(3) Represents the average quarterly price per barrel over the period.

(4) Growth rates are calculated on an annualized basis spanning years 2 to 5.

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

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

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

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

Scenario design and weightings

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

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

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

Transfers between stages

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

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

	As at					
	October 31, 2019			October 31, 2018		
	ACL – All performing loans in Stage 1	Impact of staging	Stage 1 and 2 ACL	ACL – All performing loans in Stage 1	Impact of staging	Stage 1 and 2 ACL
Performing loans (1)	\$ 1,737	\$ 826	\$ 2,563	\$ 1,526	\$ 841	\$ 2,367

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

Credit risk exposure by internal risk rating

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

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

(1) As at October 31, 2019, 86% of credit-impaired loans were either fully or partially collateralized (October 31, 2018 – 88%). For details on the types of collateral held against credit-impaired assets and our policies on collateral, refer to the Credit risk mitigation section of Management's Discussion and Analysis.

(2) In certain cases where an internal risk rating is not assigned, we use other approved credit risk assessments or rating methodologies, policies and tools to manage our credit risk.

(3) Items not subject to impairment are loans held at FVTPL.

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

Loans past due but not impaired ⁽¹⁾

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

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

Note 6 Derecognition of financial assets

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

Transferred financial assets not derecognized

Securitization of Canadian residential mortgage loans

We periodically securitize insured Canadian residential mortgage loans through the creation of MBS pools under the National Housing Act MBS (NHA MBS) program. All loans securitized under the NHA MBS program are required to be insured by the Canadian Mortgage and Housing Corporation (CMHC) or a third-party insurer. We require the borrower to pay for mortgage insurance when the loan amount is greater than 80% of the original appraised value of the property (loan-to-value (LTV) ratio). For residential mortgage loans securitized under this program with LTV ratios less than 80%, we are required to insure the mortgages at our own expense. Under the NHA MBS program, we are responsible for making all payments due on our issued MBS, regardless of whether we collect the necessary funds from the mortgagor or the insurer. When a borrower defaults on a mortgage, we submit a claim to the insurer if the amount recovered from the collection or foreclosure process is lower than the sum of the principal balance, accrued interest and collection costs on the outstanding loan. The insurance claim process is managed by the insurance provider in accordance with the insurer's policies and covers the entire unpaid loan balance plus generally up to 12 months of interest, selling costs and other eligible expenses. If an insurance claim is denied, a loss is recognized in Provision for credit losses in our Consolidated Statements of Income. The amount recorded as a loss is not significant to our Consolidated Financial Statements and no significant losses were incurred due to legal action arising from mortgage default during 2019 and 2018.

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

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

Securities sold under repurchase agreements and securities loaned

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

Note 6 Derecognition of financial assets (continued)

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

(Millions of Canadian dollars)	As at							
	October 31, 2019				October 31, 2018			
	Canadian residential mortgage loans (1), (2)	Securities repurchase agreements (3)	Securities loaned (3)	Total	Canadian residential mortgage loans (1), (2)	Securities repurchase agreements (3)	Securities loaned (3)	Total
Carrying amount of transferred assets that do not qualify for derecognition	\$ 32,794	\$ 220,250	\$ 6,336	\$ 259,380	\$ 34,105	\$ 202,543	\$ 4,271	\$ 240,919
Carrying amount of associated liabilities	32,615	220,250	6,336	259,201	33,975	202,543	4,271	240,789
Fair value of transferred assets	\$ 32,757	\$ 220,250	\$ 6,336	\$ 259,343	\$ 33,490	\$ 202,544	\$ 4,271	\$ 240,305
Fair value of associated liabilities	33,143	220,250	6,336	259,729	33,916	202,544	4,271	240,731
Fair value of net position	\$ (386)	\$ –	\$ –	\$ (386)	\$ (426)	\$ –	\$ –	\$ (426)

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

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

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

Note 7 Structured entities

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

Consolidated structured entities

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

RBC-administered multi-seller conduits

We generally do not maintain ownership in the multi-seller conduits that we administer and generally do not have rights to, or control of, their assets. However, we issue asset-backed commercial paper (ABCP) through a multi-seller conduit that does not have a first loss investor with substantive power to direct the significant operating activities of the conduit. This conduit is consolidated because we have exposure to variability of returns from performance in the multi-seller arrangements through providing transaction-specific and program-wide liquidity, credit and loan facilities to the conduit and have decision-making power over the relevant activities. As of October 31, 2019, \$1.2 billion of financial assets held by the conduit was included in Loans (October 31, 2018 – \$2.4 billion) and \$0.7 billion of ABCP issued by the conduit was included in Deposits (October 31, 2018 – \$1.3 billion) on our Consolidated Balance Sheets.

Credit card securitization vehicle

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

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

We consolidate the structured entity because we have decision-making power over the timing and size of future issuances and other relevant activities which were predetermined by us at inception. We also obtain significant funding benefits and are exposed to variability from the performance of the underlying credit card receivables through our retained interest. As at October 31, 2019, \$7.1 billion of notes issued by our credit card securitization vehicle were included in Deposits on our Consolidated Balance Sheets (October 31, 2018 – \$8.5 billion).

Collateralized commercial paper vehicle

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

We consolidate the structured entity because we have decision-making power over the relevant activities, are the sole borrower from the structure, and are exposed to a majority of the residual ownership risks through the credit support provided. As at October 31, 2019, \$16.2 billion of commercial paper issued by the vehicle was included in Deposits on our Consolidated Balance Sheets (October 31, 2018 – \$16.6 billion).

Covered bonds

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

We consolidate the Guarantor LP as we have the decision-making power over the relevant activities through our role as general partner and are exposed to variability from the performance of the underlying mortgages. As at October 31, 2019, the total amount of mortgages transferred and outstanding was \$53.9 billion (October 31, 2018 – \$53.0 billion) and \$39.8 billion of covered bonds were recorded as Deposits on our Consolidated Balance Sheets (October 31, 2018 – \$36.9 billion).

Municipal bond TOB structures

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

We consolidate both the CE trust and TOB trust when we are the holder of the residual certificate as we have decision-making power over the relevant activities, including the selection of the underlying municipal bonds and the ability to terminate the structure, and are exposed to variability from the performance of the underlying municipal bonds. As at October 31, 2019, \$8.3 billion of municipal bonds were included in Investment securities related to consolidated TOB structures (October 31, 2018 – \$7.1 billion) and a corresponding \$8.7 billion of floating-rate certificates were included in Deposits on our Consolidated Balance Sheets (October 31, 2018 – \$7.6 billion).

RBC managed investment funds

We are sponsors and investment managers of mutual and pooled funds, which give us the ability to direct the investment decisions of the funds. We consolidate those mutual and pooled funds in which our interests, which include direct investment in seed capital plus management or performance fees, indicate that we are acting as a principal. As at October 31, 2019, \$465 million of Trading securities held in the consolidated funds (October 31, 2018 – \$548 million) and \$95 million of Other liabilities representing the fund units held by third parties (October 31, 2018 – \$128 million) were recorded on our Consolidated Balance Sheets.

Unconsolidated structured entities

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

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

	As at October 31, 2019					
	Multi-seller conduits (1)	Structured finance	Non-RBC managed investment funds	Third-party securitization vehicles	Other	Total
(Millions of Canadian dollars)						
On-balance sheet assets						
Securities	\$ 75	\$ –	\$ 1,865	\$ –	\$ 503	\$ 2,443
Loans	–	2,718	–	6,392	1,517	10,627
Derivatives	97	–	–	–	83	180
Other assets	–	60	–	–	244	304
	\$ 172	\$ 2,778	\$ 1,865	\$ 6,392	\$ 2,347	\$ 13,554
On-balance sheet liabilities						
Derivatives	\$ 20	\$ –	\$ –	\$ –	\$ –	\$ 20
Other liabilities	30	–	–	–	–	30
	\$ 50	\$ –	\$ –	\$ –	\$ –	\$ 50
Maximum exposure to loss (2)	\$ 38,032	\$ 6,446	\$ 2,123	\$ 10,756	\$ 2,667	\$ 60,024
Total assets of unconsolidated structured entities	\$ 37,192	\$ 17,571	\$ 412,046	\$ 84,282	\$ 293,423	\$ 844,514

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

- (1) Total assets of unconsolidated structured entities represent the maximum assets that may have to be purchased by the conduits under purchase commitments outstanding. Of the purchase commitments outstanding, the conduits have purchased financial assets totalling \$23.6 billion as at October 31, 2019 (October 31, 2018 – \$24.7 billion).
- (2) The maximum exposure to loss resulting from our interests in these entities consists mostly of investments, loans, fair value of derivatives, liquidity and credit enhancement facilities. The maximum exposure to loss of the multi-seller conduits is higher than the on-balance sheet assets primarily because of the notional amounts of the backstop liquidity and credit enhancement facilities. Refer to Note 25.

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

Multi-seller conduits

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

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

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

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

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

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

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

Structured finance

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

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

We provide senior warehouse financing to structured entities that are established by third parties to acquire loans for the purposes of issuing a term collateralized loan obligation (CLO) transaction. Subordinated financing is provided during the

warehouse phase by one or more third-party equity investors. We act as the arranger and placement agent for the term CLO transaction. Proceeds from the sale of the term CLO are used to repay our senior warehouse financing, at which point we have no further involvement with the transaction. We do not consolidate these CLO structures as we do not have decision-making power over the relevant activities of the entity, which include the initial selection and subsequent management of the underlying debt portfolio.

We provide senior financing to unaffiliated structured entities that are established by third parties to acquire loans. These facilities tend to be longer in term than the CLO warehouse facilities and benefit from credit enhancement designed to cover a multiple of historical losses. We do not consolidate these structures as we do not have decision making power over the relevant activities of the entity, which include the initial selection and subsequent management of the underlying debt portfolio.

Non-RBC managed investment funds

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

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

Third-party securitization vehicles

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

Other

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

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

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

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

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

Other interests in unconsolidated structured entities

In the normal course of business, we buy and sell passive interests in certain third-party structured entities, including mutual funds, exchange traded funds, and government-sponsored ABS vehicles. Our investments in these entities are managed as part of larger portfolios which are held for trading, liquidity or hedging purposes. We did not create or sponsor these entities and do not have any decision-making power over their ongoing activities. Our maximum exposure to loss is limited to our on-balance sheet investments in these entities, which are not included in the table above. As at October 31, 2019 and 2018, our investments in these entities were included in Trading and Investment securities on our Consolidated Balance Sheets. Refer to Note 3 and Note 4 for further details on our Trading and Investment securities.

Sponsored entities

We are a sponsor of certain structured entities in which we have interests but do not consolidate. In determining whether we are a sponsor of a structured entity, we consider both qualitative and quantitative factors, including the purpose and nature of the entity, our initial and continuing involvement and whether we hold subordinated interests in the entity. We are considered to be the sponsor of certain credit investment products, tax credit entities, RBC managed mutual funds and a commercial mortgage securitization vehicle. During the year ended October 31, 2019, we transferred commercial mortgages with a carrying amount of \$696 million (October 31, 2018 – \$352 million) to a sponsored securitization vehicle in which we did not have any interests as at the end of the reporting period.

Financial support provided to structured entities

During the years ended October 31, 2019 and 2018, we have not provided any financial or non-financial support to any consolidated or unconsolidated structured entities when we were not contractually obligated to do so. Furthermore, we have no intention to provide such support in the future.

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

Financial derivatives

Forwards and futures

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

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

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

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

Swaps

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

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

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

Options

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

Credit derivatives

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

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

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

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

Other derivative products

Other contracts are stable value and equity derivative contracts.

Non-financial derivatives

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

Derivatives issued for trading purposes

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

Derivatives issued for other-than-trading purposes

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

Interest rate swaps are used to manage our exposure to interest rate risk by modifying the repricing or maturity characteristics of existing and/or forecasted assets and liabilities, including funding and investment activities. Purchased options are used to hedge redeemable deposits and other options embedded in consumer products. We manage our exposure to foreign

currency risk with cross currency swaps and foreign exchange forward contracts. We predominantly use credit derivatives to manage our credit exposures. We mitigate industry sector concentrations and single-name exposures related to our credit portfolio by purchasing credit derivatives to transfer credit risk to third parties.

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

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

(Millions of Canadian dollars)	As at October 31, 2019 (1)					
	Term to maturity				Trading	Other than Trading
	Within 1 year	1 through 5 years	Over 5 years	Total		
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	\$ 2,014,752	\$ 179,624	\$ 387	\$ 2,194,763	\$ 2,186,862	\$ 7,901
Swaps	3,294,746	5,026,410	3,331,025	11,652,181	11,180,497	471,684
Options purchased	83,247	462,599	174,042	719,888	719,888	–
Options written	77,601	464,906	182,690	725,197	725,197	–
Foreign exchange contracts						
Forward contracts	1,715,266	30,523	985	1,746,774	1,724,606	22,168
Cross currency swaps	79,264	50,416	55,166	184,846	177,622	7,224
Cross currency interest rate swaps	469,910	894,250	425,301	1,789,461	1,743,465	45,996
Options purchased	54,756	14,409	3,061	72,226	72,226	–
Options written	54,985	14,969	3,383	73,337	73,337	–
Credit derivatives (2)	2,693	14,724	3,437	20,854	20,341	513
Other contracts (3)	201,489	90,436	18,463	310,388	303,893	6,495
Exchange-traded contracts						
Interest rate contracts						
Futures – long positions	107,054	118,805	187	226,046	226,046	–
Futures – short positions	363,947	120,247	46	484,240	484,240	–
Options purchased	56,657	36,985	–	93,642	93,642	–
Options written	59,840	16,395	–	76,235	76,235	–
Foreign exchange contracts						
Futures – long positions	28	–	–	28	28	–
Futures – short positions	–	–	–	–	–	–
Other contracts	214,725	44,245	–	258,970	258,970	–
	\$ 8,850,960	\$ 7,579,943	\$ 4,198,173	\$ 20,629,076	\$ 20,067,095	\$ 561,981

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

(1) On November 1, 2018, we prospectively implemented the standardized approach for measuring counterparty credit risk (SA-CCR) in accordance with the Capital Adequacy Requirements (CAR) guidelines in determining our derivative notional amounts.

(2) Credit derivatives with a notional value of \$0.5 billion (October 31, 2018 – \$0.5 billion) are economic hedges. Trading credit derivatives comprise protection purchased of \$12.6 billion (October 31, 2018 – \$6.2 billion) and protection sold of \$7.7 billion (October 31, 2018 – \$3.6 billion).

(3) Under SA-CCR, Other contracts exclude loan syndication derivatives of \$7.7 billion.

Fair value of derivative instruments (1)

(Millions of Canadian dollars)	As at			
	October 31, 2019		October 31, 2018	
	Positive	Negative	Positive	Negative
Held or issued for trading purposes				
Interest rate contracts				
Forward rate agreements	\$ 30	\$ 31	\$ 308	\$ 232
Swaps	39,669	32,570	29,340	25,501
Options purchased	5,898	–	3,211	–
Options written	–	6,756	–	3,471
	45,597	39,357	32,859	29,204
Foreign exchange contracts				
Forward contracts	11,263	11,755	13,367	12,929
Cross currency swaps	529	223	174	258
Cross currency interest rate swaps	26,569	26,188	26,837	25,849
Options purchased	1,242	–	1,540	–
Options written	–	898	–	1,272
	39,603	39,064	41,918	40,308
Credit derivatives	169	279	38	89
Other contracts	15,356	18,517	17,668	18,300
	100,725	97,217	92,483	87,901
Held or issued for other-than-trading purposes				
Interest rate contracts				
Swaps	848	742	1,226	1,142
	848	742	1,226	1,142
Foreign exchange contracts				
Forward contracts	116	118	31	33
Cross currency swaps	193	527	212	423
Cross currency interest rate swaps	904	501	1,145	1,104
	1,213	1,146	1,388	1,560
Credit derivatives	–	3	–	5
Other contracts	181	140	150	179
	2,242	2,031	2,764	2,886
Total gross fair values before:	102,967	99,248	95,247	90,787
Valuation adjustments determined on a pooled basis	(697)	5	(625)	34
Impact of netting agreements that qualify for balance sheet offset	(710)	(710)	(583)	(583)
	\$ 101,560	\$ 98,543	\$ 94,039	\$ 90,238

(1) The fair value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

Fair value of derivative instruments by term to maturity (1)

(Millions of Canadian dollars)	As at							
	October 31, 2019				October 31, 2018			
	Less than 1 year	1 through 5 years	Over 5 years	Total	Less than 1 year	1 through 5 years	Over 5 years	Total
Derivative assets	\$ 25,342	\$ 28,568	\$ 47,650	\$ 101,560	\$ 28,241	\$ 29,197	\$ 36,601	\$ 94,039
Derivative liabilities	25,495	26,503	46,545	98,543	26,720	27,013	36,505	90,238

(1) The fair value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

Derivative-related credit risk

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

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

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

effects of netting in cases where the enforceability of that netting is supported by appropriate legal analysis as documented in our trading credit risk policies.

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

Replacement cost and credit equivalent amounts are determined in accordance with OSFI's non-modelled regulatory SA-CCR under the CAR guidelines beginning November 1, 2018. The replacement cost represents the total fair value of all outstanding contracts in a gain position after factoring in the master netting agreements and applicable margins, scaled by a regulatory factor. The credit equivalent amount is defined as the replacement cost plus an additional amount for potential future credit exposure also scaled by a regulatory factor. The risk-weighted equivalent is determined by applying appropriate risk-weights to the credit equivalent amount, including those risk weights reflective of model approval under the internal ratings based approach. As at October 31, 2018, the replacement cost and credit equivalent amounts were calculated under OSFI's non-modelled regulatory current exposure method for counterparty risk.

Derivative-related credit risk ⁽¹⁾

(Millions of Canadian dollars)	As at					
	October 31, 2019 ⁽²⁾			October 31, 2018		
	Replacement cost	Credit equivalent amount ⁽³⁾	Risk-weighted equivalent ⁽⁴⁾	Replacement cost	Credit equivalent amount ⁽³⁾	Risk-weighted equivalent ⁽⁴⁾
Over-the-counter contracts						
Interest rate contracts						
Forward rate agreements	\$ 18	\$ 73	\$ 19	\$ 307	\$ 324	\$ 13
Swaps	6,487	15,911	6,229	9,671	20,321	3,363
Options purchased	149	547	326	610	857	407
Options written	–	256	113	–	–	–
Foreign exchange contracts						
Forward contracts	2,333	15,822	3,899	4,589	10,944	3,439
Swaps	3,047	15,678	4,001	9,342	13,718	5,002
Options purchased	404	908	285	443	1,100	478
Options written	4	213	67	–	–	–
Credit derivatives ⁽⁵⁾	156	613	40	71	770	153
Other contracts	1,972	10,766	4,853	9,709	9,959	4,303
Exchange-traded contracts	5,439	19,630	393	2,912	11,285	225
	\$ 20,009	\$ 80,417	\$ 20,225	\$ 37,654	\$ 69,278	\$ 17,383

(1) The amounts presented are net of master netting agreements in accordance with CAR guidelines.

(2) On November 1, 2018, we prospectively implemented SA-CCR in accordance with CAR guidelines in determining our replacement cost, credit equivalent amount and risk-weighted equivalent.

(3) Beginning on November 1, 2018, the credit equivalent amount includes collateral in accordance with CAR guidelines. As at October 31, 2018, the credit equivalent amount included \$16 billion of collateral applied.

(4) The risk-weighted balances are calculated in accordance with CAR guidelines and exclude CVA of \$13 billion (October 31, 2018 – \$12 billion).

(5) The October 31, 2018 amounts exclude credit derivatives issued for other-than-trading purposes related to bought protection.

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

(Millions of Canadian dollars)	As at October 31, 2019 ⁽¹⁾								
	Risk rating ⁽²⁾					Counterparty type ⁽³⁾			
	AAA, AA	A	BBB	BB or lower	Total	Banks	OECD governments	Other	Total
Gross positive replacement cost	\$ 27,126	\$ 38,812	\$ 20,620	\$ 16,409	\$ 102,967	\$ 48,509	\$ 18,126	\$ 36,332	\$ 102,967
Impact of master netting agreements and applicable margins	23,146	35,088	16,719	8,005	82,958	47,376	17,705	17,877	82,958
Replacement cost (after netting agreements)	\$ 3,980	\$ 3,724	\$ 3,901	\$ 8,404	\$ 20,009	\$ 1,133	\$ 421	\$ 18,455	\$ 20,009

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

(1) On November 1, 2018, we prospectively implemented SA-CCR in accordance with CAR guidelines in determining our replacement cost.

(2) Our internal risk ratings for major counterparty types approximate those of public ratings agencies. Ratings of AAA, AA, A and BBB represent investment grade ratings and ratings of BB or lower represent non-investment grade ratings.

(3) Counterparty type is defined in accordance with CAR guidelines.

Derivatives in hedging relationships

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

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

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

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

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

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

Interest rate risk

We use interest rate contracts to manage our exposure to interest rate risk by modifying the repricing characteristics of existing and/or forecasted assets and liabilities, including funding and investment activities. The swaps are designated in either a fair value hedge or a cash flow hedge and predominately reference Interbank Offered Rates (IBORs) across multiple jurisdictions. Certain swaps will be affected by the Interest Rate Benchmark Reform as the market transitions to alternative risk free or nearly risk free rates by the end of 2021.

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

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

For cash flow hedges, we use interest rate swaps to manage the exposure to cash flow variability of our variable rate instruments as a result of changes in benchmark interest rates. The variable rate instruments and forecast transactions which reference certain IBORs will be affected by the Interest Rate Benchmark Reform. Whilst some of the interest rate derivatives are entered into on a one-to-one basis to manage a specific exposure, other interest rate derivatives may be entered into for managing interest rate risks of a portfolio of assets and liabilities.

Foreign exchange risk

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

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

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

Equity price risk

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

Credit risk

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

Derivative instruments designated in hedging relationships

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

Derivatives and non-derivative instruments (1)

(Millions of Canadian dollars)	As at							
	October 31, 2019				October 31, 2018			
	Designated as hedging instruments in hedging relationships				Designated as hedging instruments in hedging relationships			
	Fair Value	Cash Flow	Net investment	Not designated in a hedging relationship	Fair Value (2)	Cash Flow (2)	Net investment	Not designated in a hedging relationship (2)
Assets								
Derivative instruments	\$ 146	\$ 77	\$ 52	\$ 101,285	\$ 404	\$ 12	\$ 13	\$ 93,610
Liabilities								
Derivative instruments	187	526	70	97,760	4	413	28	89,793
Non-derivative instruments	–	–	27,688	n.a.	–	–	25,565	n.a.

(1) The fair value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

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

n.a. not applicable

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

Fair value hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2019					
	Notional amounts				Carrying amount (1)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	\$ 4,625	\$ 20,439	\$ 3,909	\$ 28,973	\$ 2	\$ 187
Hedge of fixed rate liabilities	16,003	48,361	9,065	73,429	144	–
Weighted average fixed interest rate						
Hedge of fixed rate assets	1.9%	2.2%	2.7%	2.2%		
Hedge of fixed rate liabilities	1.7%	1.8%	1.8%	1.7%		

(Millions of Canadian dollars, except average rates)	As at October 31, 2018					
	Notional amounts				Carrying amount (1), (2)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of fixed rate assets	\$ 2,518	\$ 12,778	\$ 4,668	\$ 19,964	\$ 311	\$ 4
Hedge of fixed rate liabilities	14,946	47,658	7,432	70,036	93	–
Weighted average fixed interest rate						
Hedge of fixed rate assets	1.1%	2.4%	2.8%	2.3%		
Hedge of fixed rate liabilities	1.6%	1.8%	1.8%	1.8%		

(1) The carrying value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

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

Cash flow hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2019					
	Notional amounts				Carrying amount (1)	
	Within 1 year	1 through 5 years	Over 5 years	Total	Assets	Liabilities
Interest rate risk						
Interest rate contracts						
Hedge of variable rate assets	\$ 17,327	\$ 11,729	\$ 1,696	\$ 30,752	\$ –	\$ –
Hedge of variable rate liabilities	200	54,610	4,803	59,613	–	–
Weighted average fixed interest rate						
Hedge of variable rate assets	2.1%	2.0%	2.6%	2.1%		
Hedge of variable rate liabilities	2.6%	1.9%	2.4%	2.0%		
Foreign exchange risk						
Cross currency swaps						
Weighted average CAD-CHF exchange rate	\$ 2,937	\$ 63	\$ 88	\$ 3,088	\$ 2	\$ 526
Weighted average CAD-EUR exchange rate	–	–	–	–		
Weighted average USD-EUR exchange rate	–	1.48	1.55	1.52		
Weighted average USD-EUR exchange rate	1.33	–	–	1.33		

Note 8 Derivative financial instruments and hedging activities (continued)

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

(1) The carrying value reflects the impact of the election to characterize the daily variation margin as settlement of the related derivative fair values as permitted by certain central counterparties.

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

Net investment hedges

(Millions of Canadian dollars, except average rates)	As at October 31, 2019				Carrying amount	
	Notional/Principal				Assets	Liabilities
	Within 1 year	1 through 5 years	Over 5 years	Total		
Foreign exchange risk						
Foreign currency liabilities						
Weighted average CAD-USD exchange rate	1.31	1.29	1.31	1.30	n.a.	\$ 27,859
Weighted average CAD-EUR exchange rate	–	–	1.51	1.51		
Weighted average CAD-GBP exchange rate	–	1.69	–	1.69		
Forward contracts						
Weighted average CAD-USD exchange rate	1.33	–	–	1.33	\$ 52	\$ 70
Weighted average CAD-EUR exchange rate	1.47	–	–	1.47		
Weighted average CAD-GBP exchange rate	1.67	–	–	1.67		

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

n.a. not applicable

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

Fair value hedges – assets and liabilities designated as hedged items

(Millions of Canadian dollars)	As at and for the year ended October 31, 2019						Changes in fair values used for calculating hedge ineffectiveness
	Carrying amount		Accumulated amount of fair value adjustments on the hedged item included in the carrying amount		Balance sheet item(s):		
	Assets	Liabilities	Assets	Liabilities			
Interest rate risk							
Fixed rate assets (1)							
	\$29,985	\$ –	\$ 569	\$ –	Securities – Investment, net of applicable allowance; Loans – Retail	\$ 1,028	
Fixed rate liabilities (1)							
	–	74,099	–	693	Deposits – Business and government; Subordinated debentures	(2,045)	

	As at and for the year ended October 31, 2018				Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness
	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		
Interest rate risk						
Fixed rate assets (1)	\$ 20,172	\$ -	\$ (529)	\$ -	Securities – Investment, net of applicable allowance; Loans – Retail	\$ (650)
Fixed rate liabilities (1)	-	68,714	-	(1,302)	Deposits – Business and government; Subordinated debentures	1,018

(1) As at October 31, 2019, the accumulated amount of fair value hedge adjustments remaining in the Balance Sheet for hedged items that have ceased to be adjusted for hedging gains and losses is a loss of \$53 million for fixed-rate assets and a loss of \$170 million for fixed-rate liabilities (October 31, 2018 – \$105 million and \$277 million, respectively).

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

	As at and for the year ended October 31, 2019			
	Balance sheet item(s):	Changes in fair values used for calculating hedge ineffectiveness	Cash flow hedge/foreign currency translation reserve	
(Millions of Canadian dollars)			Continuing hedges	Discontinued hedges
Cash flow hedges				
<i>Interest rate risk</i>				
Variable rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	\$ (608)	\$ 163	\$ 84
Variable rate liabilities	Deposits – Business and government; Deposits – Personal	1,274	(372)	70
<i>Foreign exchange risk</i>				
Fixed rate assets	Securities – Investment, net of applicable allowance; Loans – Retail	(5)	(1)	-
Fixed rate liabilities	Deposits – Business and government	125	9	-
Net investment hedges				
<i>Foreign exchange risk</i>				
Foreign subsidiaries	n.a.	(7)	(5,407)	(871)

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

n.a. not applicable

Effectiveness of designated hedging relationships

(Millions of Canadian dollars)	For the year ended October 31, 2019			
	Change in fair value of hedging instrument	Hedge ineffectiveness recognized in income (1)	Changes in the value of the hedging instrument recognized in OCI	Amount reclassified from hedge reserves to income
Fair value hedges				
<i>Interest rate risk</i>				
Interest rate contracts – fixed rate assets	\$ (1,060)	\$ (32)	\$ –	\$ –
Interest rate contracts – fixed rate liabilities	2,032	(13)	–	–
Cash flow hedges				
<i>Interest rate risk</i>				
Interest rate contracts – variable rate assets	605	8	582	(25)
Interest rate contracts – variable rate liabilities	(1,261)	(5)	(1,265)	220
<i>Foreign exchange risk</i>				
Cross currency swap – fixed rate assets	5	–	8	5
Cross currency swap – fixed rate liabilities	(125)	–	(193)	(106)
Net investment hedges				
<i>Foreign exchange risk</i>				
Foreign currency liabilities	(50)	–	(50)	–
Forward contracts	57	–	57	(2)

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

(1) Hedge ineffectiveness recognized in income included losses of \$70 million that are excluded from the assessment of hedge effectiveness and are offset by economic hedges (October 31, 2018 – \$46 million).

Reconciliation of components of equity

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

(Millions of Canadian dollars)	For the year ended October 31, 2019		For the year ended October 31, 2018	
	Cash flow hedge reserve	Foreign currency translation reserve	Cash flow hedge reserve	Foreign currency translation reserve
Balance at the beginning of the year	\$ 688	\$ 4,147	\$ 431	\$ 3,545
Cash flow hedges				
Effective portion of changes in fair value:				
Interest rate risk	(683)		399	
Foreign exchange risk	(185)		(147)	
Equity price risk	108		(18)	
Net amount reclassified to profit or loss:				
Ongoing hedges:				
Interest rate risk	24		44	
Foreign exchange risk	104		172	
Equity price risk	(93)		7	
De-designated hedges:				
Interest rate risk	(219)		(108)	
Foreign exchange risk	-		-	
Net gain on hedge of net investment in foreign operations				
Foreign exchange denominated debt		(50)		(331)
Forward foreign exchange contracts		57		17
Foreign currency translation differences for foreign operations		66		841
Reclassification of losses (gains) on foreign currency translation to income	-	2	-	-
Reclassification of losses (gains) on net investment hedging activities to income	-	2	-	-
Tax on movements on reserves during the period	250	(3)	(92)	75
Balance at the end of the year	\$ (6)	\$ 4,221	\$ 688	\$ 4,147

Note 9 Premises and equipment

(Millions of Canadian dollars)	For the year ended October 31, 2019						
	Land	Buildings	Computer equipment	Furniture, fixtures and other equipment	Leasehold improvements	Work in process	Total
Cost							
Balance at beginning of period	\$ 153	\$ 1,399	\$ 2,123	\$ 1,373	\$ 2,726	\$ 264	\$ 8,038
Additions (1)	-	-	195	129	81	591	996
Transfers from work in process	-	4	84	82	262	(432)	-
Disposals	-	(10)	(68)	(29)	(65)	-	(172)
Foreign exchange translation	-	-	3	(1)	2	-	4
Other	-	2	(12)	3	(5)	9	(3)
Balance at end of period	\$ 153	\$ 1,395	\$ 2,325	\$ 1,557	\$ 3,001	\$ 432	\$ 8,863
Accumulated depreciation							
Balance at beginning of period	\$ -	\$ 669	\$ 1,556	\$ 1,051	\$ 1,930	\$ -	\$ 5,206
Depreciation	-	45	273	113	196	-	627
Disposals	-	(8)	(61)	(26)	(56)	-	(151)
Foreign exchange translation	-	-	1	-	1	-	2
Other	-	(3)	(11)	(1)	3	-	(12)
Balance at end of period	\$ -	\$ 703	\$ 1,758	\$ 1,137	\$ 2,074	\$ -	\$ 5,672
Net carrying amount at end of period	\$ 153	\$ 692	\$ 567	\$ 420	\$ 927	\$ 432	\$ 3,191

Note 9 Premises and equipment (continued)

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

(1) As at October 31, 2019, we had total contractual commitments of \$338 million to acquire premises and equipment (October 31, 2018 – \$273 million).

Note 10 Goodwill and other intangible assets
Goodwill

(Millions of Canadian dollars)	For the year ended October 31, 2019									Total
	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	
Balance at beginning of period	\$ 2,528	\$ 1,729	\$ 579	\$ 1,986	\$ 2,870	\$ 118	\$ 112	\$ 148	\$ 1,067	\$ 11,137
Acquisitions	27	–	–	–	71	–	–	–	–	98
Dispositions	–	–	–	(20)	–	–	–	–	–	(20)
Currency translations	–	(2)	–	19	2	2	–	–	–	21
Balance at end of period	\$ 2,555	\$ 1,727	\$ 579	\$ 1,985	\$ 2,943	\$ 120	\$ 112	\$ 148	\$ 1,067	\$ 11,236

(Millions of Canadian dollars)	For the year ended October 31, 2018									Total
	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	
Balance at beginning of period	\$ 2,527	\$ 1,694	\$ 576	\$ 2,006	\$ 2,745	\$ 120	\$ 112	\$ 148	\$ 1,049	\$ 10,977
Acquisitions	1	–	–	–	80	–	–	–	–	81
Dispositions	–	–	–	–	(8)	–	–	–	–	(8)
Currency translations	–	35	3	(20)	53	(2)	–	–	18	87
Balance at end of period	\$ 2,528	\$ 1,729	\$ 579	\$ 1,986	\$ 2,870	\$ 118	\$ 112	\$ 148	\$ 1,067	\$ 11,137

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

In our 2019 and 2018 annual impairment tests, the recoverable amounts of our Caribbean Banking and International Wealth Management CGUs were based on their fair value less costs of disposal. The recoverable amounts of all other CGUs tested were based on their value in use.

Value in use

We calculate value in use using a five-year discounted cash flow method, with the exception of our U.S. Wealth Management (including City National) CGU where cash flow projections covering a six-year period were used, which more closely aligns with the strategic growth plan resulting from the acquisition of City National. Future cash flows are based on financial plans agreed by management, estimated based on forecast results, business initiatives, capital required to support future cash flows and returns to shareholders. Key drivers of future cash flows include net interest margins and average interest-earning assets. The values

assigned to these drivers over the forecast period are based on past experience, external and internal economic forecasts, and management's expectations of the impact of economic conditions on our financial results. Beyond the initial cash flow projection period, cash flows are assumed to increase at a constant rate using a nominal long-term growth rate (terminal growth rate), with the exception of our U.S. Wealth Management (including City National) CGU where we applied a mid-term growth rate consistent with our growth expectations for this business, reverting to the terminal growth rate after 10 years. Terminal growth rates are based on the current market assessment of gross domestic product and inflation for the countries within which the CGU operates. The discount rates used to determine the present value of each CGU's projected future cash flows are based on the bank-wide cost of capital, adjusted for the risks to which each CGU is exposed. CGU-specific risks include: country risk, business/operational risk, geographic risk (including political risk, devaluation risk, and government regulation), currency risk, and price risk (including product pricing risk and inflation).

The estimation of value in use involves significant judgment in the determination of inputs to the discounted cash flow model and is most sensitive to changes in future cash flows, discount rates and terminal growth rates applied to cash flows beyond the forecast period. The sensitivity of key inputs and assumptions used was tested by recalculating the recoverable amount using reasonably possible changes to those assumptions. The post-tax discount rates were increased by 1%, terminal growth rates were decreased by 1%, and future cash flows were reduced by 10%. As at August 1, 2019, no reasonably possible change in an individual key input or assumption, as described, would result in a CGU's carrying amount exceeding its recoverable amount based on value in use.

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

	As at			
	August 1, 2019		August 1, 2018	
	Discount rate (1)	Terminal growth rate	Discount rate (1), (2)	Terminal growth rate
Group of cash generating units				
Canadian Banking	10.2%	3.0%	10.0%	3.0%
Caribbean Banking	11.9	4.2	11.8	4.3
Canadian Wealth Management	11.2	3.0	11.2	3.0
Global Asset Management	11.1	3.0	11.0	3.0
U.S. Wealth Management (including City National)	11.2	3.0	11.0	3.0
International Wealth Management	10.8	3.0	10.1	3.0
Insurance	11.0	3.0	11.0	3.0
Investor & Treasury Services	10.9	3.0	11.2	3.0
Capital Markets	11.8	3.0	12.4	3.0

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

(2) Discount rates have been revised from those previously presented.

Fair value less costs of disposal – Caribbean Banking

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

We use significant judgement to determine inputs to the discounted cash flow model which is most sensitive to changes in future cash flows, discount rates and terminal growth rates applied to cash flows beyond the forecast period. The sensitivity of these key inputs was tested by applying a reasonably possible change to these assumptions. As at August 1, 2019, the recoverable amount of our Caribbean Banking CGU, based on fair value less costs of disposal, was 126% of its carrying amount. If the post-tax discount rate was increased by 1.8%, holding other individual factors constant, the recoverable amount would approximate the carrying amount. No other reasonably possible change in an individual key input or assumption, including decreasing the terminal growth rates by 2.4% or reducing future cash flows by 21%, would result in the CGU's carrying amount exceeding its recoverable amount based on fair value less costs of disposal.

Fair value less costs of disposal – International Wealth Management

For our International Wealth Management CGU, we calculated fair value less costs of disposal using a multiples-based approach. Each business within the CGU was valued using either a Price-to-assets-under-administration (P/AUA) or Price-to-revenue (P/Rev) multiple, as appropriate, to reflect the considerations of a prospective third-party buyer. In 2019, we applied a P/AUA multiple of 2.25x to AUA as at August 1 (August 1, 2018 – 2.5%) and a P/Rev multiple of 2.5x (August 1, 2018 – 2.5x) to revenue for the 12 months preceding the testing date. These multiples represent our best estimate from a range of reasonably possible inputs based on precedent transactions for comparable businesses. This fair value measurement is categorized as level 3 in the fair value hierarchy as certain significant inputs are not observable.

The estimation of fair value less costs of disposal involves significant judgment in the determination of the appropriate valuation approach and inputs and is most sensitive to changes in the P/AUA and P/Rev multiples. These key inputs were tested for sensitivity by reducing each multiple to the low end of the range of reasonably possible inputs considered. As at August 1, 2019, no reasonably possible change in an individual key input or assumption, as described, would result in the CGU's carrying amount exceeding its recoverable amount based on fair value less costs of disposal.

Other intangible assets

(Millions of Canadian dollars)	For the year ended October 31, 2019					
	Internally generated software	Other software	Core deposit intangibles	Customer list and relationships	In process software	Total
Gross carrying amount						
Balance at beginning of period	\$ 5,984	\$ 1,582	\$ 1,750	\$ 1,768	\$ 1,146	\$ 12,230
Additions	42	49	–	–	1,184	1,275
Acquisitions through business combinations	–	16	–	6	–	22
Transfers	1,009	42	–	–	(1,051)	–
Dispositions	–	(1)	–	–	–	(1)
Impairment losses	(94)	(6)	–	–	(42)	(142)
Currency translations	–	1	1	7	(2)	7
Other changes	–	1	(184)	(8)	5	(186)
Balance at end of period	\$ 6,941	\$ 1,684	\$ 1,567	\$ 1,773	\$ 1,240	\$ 13,205
Accumulated amortization						
Balance at beginning of period	\$ (4,501)	\$ (1,226)	\$ (654)	\$ (1,162)	\$ –	\$ (7,543)
Amortization charge for the year	(793)	(121)	(159)	(124)	–	(1,197)
Dispositions	–	–	–	–	–	–
Impairment losses	30	2	–	–	–	32
Currency translations	(1)	(1)	1	(6)	–	(7)
Other changes	9	(11)	185	1	–	184
Balance at end of period	\$ (5,256)	\$ (1,357)	\$ (627)	\$ (1,291)	\$ –	\$ (8,531)
Net balance at end of period	\$ 1,685	\$ 327	\$ 940	\$ 482	\$ 1,240	\$ 4,674

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

Note 11 Significant dispositions
Wealth Management

On October 30, 2019, we completed the sale of our private debt Global Asset Management business in the United Kingdom to Dyal Capital Partners. As a result of the transaction, we recorded a pre-tax gain of \$142 million in Non-interest income – Other (\$134 million after-tax). The assets, liabilities and equity that were included in the disposal group are not significant.

Note 12 Joint ventures and associated companies

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

(Millions of Canadian dollars)	Joint ventures		Associated companies	
	As at and for the year ended			
	October 31 2019	October 31 2018	October 31 2019	October 31 2018
Carrying amount	\$ 178	\$ 165	\$ 474	\$ 521
Share of:				
Net income	\$ 107	\$ 113	\$ (31)	\$ (92)

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

During the year ended October 31, 2019, we recognized impairment losses of \$2 million with respect to our interests in joint ventures and associated companies (October 31, 2018 – impairment losses of \$12 million).

Certain of our subsidiaries, joint ventures and associates are subject to regulatory requirements of the jurisdictions in which they operate. When these subsidiaries, joint ventures and associates are subject to such requirements, they may be restricted from transferring to us our share of their assets in the form of cash dividends, loans or advances. As at October 31, 2019, restricted net assets of these subsidiaries, joint ventures and associates were \$34.9 billion (October 31, 2018 – \$33.9 billion).

Note 13 Other assets

(Millions of Canadian dollars)	As at	
	October 31 2019	October 31 2018
Cash collateral	\$ 15,629	\$ 14,467
Margin deposits	5,688	4,940
Receivable from brokers, dealers and clients	2,511	2,868
Accounts receivable and prepaids	4,569	4,047
Investments in joint ventures and associates	652	686
Employee benefit assets	147	626
Insurance-related assets		
Collateral loans	926	991
Policy loans	95	99
Reinsurance assets	748	656
Other	78	163
Deferred income tax asset	1,989	1,475
Taxes receivable	5,553	5,456
Accrued interest receivable	2,866	2,641
Precious metals	416	361
Commodity trading receivables	4,232	1,898
Other	2,974	2,690
	\$ 49,073	\$ 44,064

Note 14 Deposits

(Millions of Canadian dollars)	As at							
	October 31, 2019				October 31, 2018			
	Demand (1)	Notice (2)	Term (3)	Total	Demand (1)	Notice (2)	Term (3)	Total
Personal	\$ 143,958	\$ 49,806	\$ 100,968	\$ 294,732	\$ 135,101	\$ 48,873	\$ 86,180	\$ 270,154
Business and government (4)	253,113	13,867	298,502	565,482	238,617	8,606	286,299	533,522
Bank	8,363	920	16,508	25,791	8,750	299	23,472	32,521
	\$ 405,434	\$ 64,593	\$ 415,978	\$ 886,005	\$ 382,468	\$ 57,778	\$ 395,951	\$ 836,197
Non-interest-bearing (5)								
Canada	\$ 93,163	\$ 5,692	\$ 137	\$ 98,992	\$ 88,119	\$ 5,086	\$ –	\$ 93,205
United States	34,632	–	–	34,632	34,098	–	–	34,098
Europe (6)	760	–	–	760	564	–	–	564
Other International	5,225	5	–	5,230	5,495	5	–	5,500
Interest-bearing (5)								
Canada	228,386	15,306	333,118	576,810	213,747	15,112	292,641	521,500
United States	4,704	39,626	41,776	86,106	2,478	33,099	67,211	102,788
Europe (4), (6)	33,073	825	30,090	63,988	32,930	1,412	25,749	60,091
Other International	5,491	3,139	10,857	19,487	5,037	3,064	10,350	18,451
	\$ 405,434	\$ 64,593	\$ 415,978	\$ 886,005	\$ 382,468	\$ 57,778	\$ 395,951	\$ 836,197

- (1) Demand deposits are deposits for which we do not have the right to require notice of withdrawal, which include both savings and chequing accounts.
- (2) Notice deposits are deposits for which we can legally require notice of withdrawal. These deposits are primarily savings accounts.
- (3) Term deposits are deposits payable on a fixed date, and include term deposits, guaranteed investment certificates and similar instruments.
- (4) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.
- (5) The geographical splits of the deposits are based on the point of origin of the deposits and where the revenue is recognized. As at October 31, 2019, deposits denominated in U.S. dollars, British pounds, Euro and other foreign currencies were \$321 billion, \$23 billion, \$45 billion and \$31 billion, respectively (October 31, 2018 – \$309 billion, \$20 billion, \$38 billion and \$31 billion, respectively).
- (6) Europe includes the United Kingdom, Luxembourg, the Channel Islands, France and Italy.

Contractual maturities of term deposits

(Millions of Canadian dollars)	As at	
	October 31, 2019	October 31, 2018
Within 1 year:		
less than 3 months	\$ 94,585	\$ 89,553
3 to 6 months	62,814	59,109
6 to 12 months	92,507	80,773
1 to 2 years	50,055	51,798
2 to 3 years	31,852	45,550
3 to 4 years	31,373	21,127
4 to 5 years	21,130	23,863
Over 5 years (1)	31,662	24,178
	\$ 415,978	\$ 395,951
Aggregate amount of term deposits in denominations of one hundred thousand dollars or more (2)	\$ 379,000	\$ 362,000

- (1) Commencing Q4 2019, the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in deposits is presented in other liabilities. Comparative amounts have been reclassified to conform with this presentation.
- (2) Aggregate amounts of term deposits in denominations of one hundred thousand dollars or more have been revised from those previously presented.

Average deposit balances and average rates of interest

(Millions of Canadian dollars, except for percentage amounts)	For the year ended			
	October 31, 2019		October 31, 2018	
	Average balances	Average rates	Average balances	Average rates
Canada	\$ 650,555	1.60%	\$ 603,582	1.28%
United States	129,903	1.17	131,715	1.00
Europe (1)	63,333	1.15	59,916	0.91
Other International	26,290	1.20	23,788	1.11
	\$ 870,081	1.49%	\$ 819,001	1.20%

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

Note 15 Insurance

Risk management

Insurance risk is the risk of fluctuations in the timing, frequency or severity of insured events, relative to our expectations at the time of underwriting. We do not have a high degree of concentration risk due to our geographic diversity and business mix. Concentration risk is not a major concern for the life and health insurance business as it does not have a material level of region-

specific characteristics. Reinsurance is also used for a majority of our businesses to lower our risk profile and limit the liability on a single claim. We manage underwriting and pricing risk through the use of underwriting guidelines which detail the class, nature and type of business that may be accepted, pricing policies by product line and centralized control of policy wordings. The risk that claims are handled or paid inappropriately is mitigated by using a range of information technology (IT) system controls and manual processes conducted by experienced staff. These, together with a range of detailed policies and procedures, ensure that all claims are handled in a timely, appropriate and accurate manner.

Reinsurance

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

Net premiums and claims

	For the year ended	
	October 31 2019	October 31 2018
<i>(Millions of Canadian dollars)</i>		
Gross premiums	\$ 4,209	\$ 4,236
Premiums ceded to reinsurers	(225)	(204)
Net premiums	\$ 3,984	\$ 4,032
Gross claims and benefits ⁽¹⁾	\$ 3,990	\$ 2,615
Reinsurers' share of claims and benefits	(241)	(224)
Net claims	\$ 3,749	\$ 2,391

(1) Includes the change in fair value of investments backing our policyholder liabilities, which are largely offset in revenue.

Insurance claims and policy benefit liabilities

All actuarial assumptions are set in conjunction with Canadian Institute of Actuaries Standards of Practice and OSFI requirements. The assumptions that have the greatest effect on the measurement of insurance liabilities, the processes used to determine them and the assumptions used as at October 31, 2019 are as follows:

Life insurance

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

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

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

Significant insurance assumptions

	As at	
	October 31 2019	October 31 2018
Life Insurance		
Canadian Insurance		
Mortality rates ⁽¹⁾	0.12%	0.11%
Morbidity rates ⁽²⁾	1.82	1.82
Future reinvestment yield ⁽³⁾	3.69	3.80
Lapse rates ⁽⁴⁾	0.50	0.50
International Insurance		
Mortality rates ⁽¹⁾	0.57	0.52
Future reinvestment yield ⁽³⁾	3.06	3.14

(1) Average annual death rate for the largest portfolio of insured policies.

(2) Average net settlement rate for the individual and group disability insurance portfolio.

(3) Ultimate reinvestment rate of the insurance operations.

(4) Ultimate policy termination rate (lapse rate) for the largest permanent life insurance portfolio that relies on higher termination rate to maintain its profitability (lapse-supported policies).

Insurance claims and policy benefit liabilities

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

(Millions of Canadian dollars)	As at					
	October 31, 2019			October 31, 2018		
	Gross	Ceded	Net	Gross	Ceded	Net
Life insurance policyholder liabilities						
Life, health and annuity	\$ 11,339	\$ 601	\$ 10,738	\$ 9,982	\$ 493	\$ 9,489
Investment contracts (1)	38	–	38	42	–	42
	\$ 11,377	\$ 601	\$ 10,776	\$ 10,024	\$ 493	\$ 9,531
Non-life insurance policyholder liabilities						
Unearned premium provision (1)	\$ 29	\$ –	\$ 29	\$ 26	\$ –	\$ 26
Unpaid claims provision	62	2	60	18	3	15
	\$ 91	\$ 2	\$ 89	\$ 44	\$ 3	\$ 41
	\$ 11,468	\$ 603	\$ 10,865	\$ 10,068	\$ 496	\$ 9,572

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

Reconciliation of life insurance policyholder liabilities

(Millions of Canadian dollars)	For the year ended					
	October 31, 2019			October 31, 2018		
	Gross	Ceded	Net	Gross	Ceded	Net
Balances at beginning of period	\$ 10,024	\$ 493	\$ 9,531	\$ 9,687	\$ 393	\$ 9,294
New and in-force policies	1,479	103	1,376	502	83	419
Changes in assumption and methodology	(122)	5	(127)	(173)	17	(190)
Net change in investment contracts	(4)	–	(4)	8	–	8
Balances at end of period	\$ 11,377	\$ 601	\$ 10,776	\$ 10,024	\$ 493	\$ 9,531

The net increase in Insurance claims and policy benefit liabilities over the prior year was comprised of the net increase in life and health liabilities and reinsurance attributable to market movements on assets backing life and health liabilities and business growth. During the year, we reviewed all key actuarial methods and assumptions which are used in determining the policy benefit liabilities resulting in a \$127 million net decrease to insurance liabilities comprised of: (i) a decrease of \$104 million for revised actuarial reserves for updated growth assumptions on investments in equity and commercial real estate; (ii) a decrease of \$78 million due to reinsurance contract renegotiations; (iii) a decrease of \$17 million due to valuation system and data changes and (iv) an increase of \$72 million arising from insurance risk related assumption updates largely due to mortality, morbidity, maintenance, property and casualty margin for adverse deviation and expense assumptions, impacting both gross and ceded insurance policyholder liabilities.

Sensitivity analysis

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

(Millions of Canadian dollars, except for percentage amounts)	Change in variable	Net income impact for the year ended	
		October 31 2019	October 31 2018
Increase in market interest rates (1)	1%	\$ (7)	\$ (2)
Decrease in market interest rates (1)	1	4	–
Increase in equity market values (2)	10	1	6
Decrease in equity market values (2)	10	(3)	(8)
Increase in maintenance expenses (3)	5	(33)	(29)
Life Insurance (3)			
Adverse change in annuitant mortality rates	2	(205)	(131)
Adverse change in assurance mortality rates	2	(60)	(59)
Adverse change in morbidity rates	5	(205)	(188)
Adverse change in lapse rates	10	(247)	(226)

- (1) Sensitivities for market interest rates include the expected current period earnings impact of a 100 basis points shift in the yield curve by increasing the current reinvestment rates while holding the assumed ultimate rates constant. The sensitivity consists of both the impact on assumed reinvestment rates in the actuarial liabilities and any changes in fair value of assets and liabilities from the yield curve shift.
- (2) Sensitivities to changes in equity market values are composed of the expected current period earnings impact from differences in the changes in fair value of the equity asset holdings and the partially offsetting impact on the actuarial liabilities.
- (3) Sensitivities to changes in maintenance expenses and life insurance actuarial assumptions include the expected current period earnings impact from recognition of increased liabilities due to an adverse change in the given assumption over the lifetime of all in-force policies.

Note 16 Segregated funds

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

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

Segregated funds net assets

(Millions of Canadian dollars)	As at	
	October 31 2019	October 31 2018
Cash	\$ 31	\$ 19
Investment in mutual funds	1,631	1,348
Other assets (liabilities) net	1	1
	\$ 1,663	\$ 1,368

Changes in net assets

(Millions of Canadian dollars)	For the year ended	
	October 31 2019	October 31 2018
Net assets at beginning of period	\$ 1,368	\$ 1,216
Additions (deductions):		
Deposits from policyholders	557	537
Net realized and unrealized gains (losses)	124	(40)
Interest and dividends	39	31
Payment to policyholders	(386)	(342)
Management and administrative fees	(39)	(34)
Net assets at end of period	\$ 1,663	\$ 1,368

Note 17 Employee benefits – Pension and other post-employment benefits

Plan characteristics

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

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

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

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

We measure our benefit obligations and pension assets as at October 31 each year. All plans are valued using the projected unit-credit method. We fund our registered defined benefit pension plans in accordance with actuarially determined amounts required to satisfy employee benefit obligations under current pension regulations. For our principal pension plan, the most recent funding actuarial valuation was completed on January 1, 2019, and the next valuation will be completed on January 1, 2020.

For the year ended October 31, 2019, total contributions to our pension plans (defined benefit and defined contribution plans) and other post-employment benefit plans were \$551 million and \$72 million (October 31, 2018 – \$594 million and \$65 million), respectively. For 2020, total contributions to our pension plans and other post-employment benefit plans are expected to be \$549 million and \$78 million, respectively.

Risks

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

Note 17 Employee benefits – Pension and other post-employment benefits (continued)

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.

(Millions of Canadian dollars)	As at			
	October 31, 2019		October 31, 2018	
	Defined benefit pension plans	Other post-employment benefit plans	Defined benefit pension plans	Other post-employment benefit plans
Canada				
Fair value of plan assets	\$ 13,679	\$ 1	\$ 12,587	\$ 1
Present value of defined benefit obligation	14,428	1,722	12,270	1,522
Net surplus (deficit)	\$ (749)	\$ (1,721)	\$ 317	\$ (1,521)
International				
Fair value of plan assets	\$ 1,106	\$ –	\$ 977	\$ –
Present value of defined benefit obligation	1,089	98	948	100
Net surplus (deficit)	\$ 17	\$ (98)	\$ 29	\$ (100)
Total				
Fair value of plan assets	\$ 14,785	\$ 1	\$ 13,564	\$ 1
Present value of defined benefit obligation	15,517	1,820	13,218	1,622
Total net surplus (deficit)	\$ (732)	\$ (1,819)	\$ 346	\$ (1,621)
Effect of asset ceiling	(1)	–	(1)	–
Total net surplus (deficit), net of effect of asset ceiling	\$ (733)	\$ (1,819)	\$ 345	\$ (1,621)
Amounts recognized in our Consolidated Balance Sheets				
Employee benefit assets	\$ 147	\$ –	\$ 626	\$ –
Employee benefit liabilities	(880)	(1,819)	(281)	(1,621)
Total net surplus (deficit), net of effect of asset ceiling	\$ (733)	\$ (1,819)	\$ 345	\$ (1,621)

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

(Millions of Canadian dollars)	As at or for the year ended			
	October 31, 2019		October 31, 2018	
	Defined benefit pension plans (1)	Other post-employment benefit plans	Defined benefit pension plans (1)	Other post-employment benefit plans
Fair value of plan assets at beginning of period	\$ 13,564	\$ 1	\$ 13,573	\$ 1
Interest income	532	–	476	–
Remeasurements				
Return on plan assets (excluding interest income)	910	–	(268)	–
Change in foreign currency exchange rate	9	–	(10)	–
Contributions – Employer	339	72	409	65
Contributions – Plan participant	48	18	49	19
Payments	(601)	(90)	(586)	(84)
Payments – amount paid in respect of any settlements	–	–	(64)	–
Other	(16)	–	(15)	–
Fair value of plan assets at end of period	\$ 14,785	\$ 1	\$ 13,564	\$ 1
Benefit obligation at beginning of period	\$ 13,218	\$ 1,622	\$ 14,005	\$ 1,845
Current service costs	297	39	359	34
Past service costs	1	–	(13)	(25)
Gains and losses on settlements	–	–	13	–
Interest expense	510	65	484	66
Remeasurements				
Actuarial losses (gains) from demographic assumptions	(4)	(7)	(164)	(66)
Actuarial losses (gains) from financial assumptions	1,977	196	(828)	(140)
Actuarial losses (gains) from experience adjustments	59	(23)	(22)	(32)
Change in foreign currency exchange rate	12	–	(15)	5
Contributions – Plan participant	48	18	49	19
Payments	(601)	(90)	(586)	(84)
Payments – amount paid in respect of any settlements	–	–	(64)	–
Benefit obligation at end of period	\$ 15,517	\$ 1,820	\$ 13,218	\$ 1,622
Unfunded obligation	\$ 29	\$ 1,671	\$ 27	\$ 1,481
Wholly or partly funded obligation	15,488	149	13,191	141
Total benefit obligation	\$ 15,517	\$ 1,820	\$ 13,218	\$ 1,622

(1) For pension plans with funding deficits, the benefit obligations and fair value of plan assets as at October 31, 2019 were \$14,329 million and \$13,449 million, respectively (October 31, 2018 – \$685 million and \$404 million, respectively).

Pension and other post-employment benefit expense

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

(Millions of Canadian dollars)	For the year ended			
	Pension plans		Other post-employment benefit plans	
	October 31 2019	October 31 2018	October 31 2019	October 31 2018
Current service costs	\$ 297	\$ 359	\$ 39	\$ 34
Past service costs	1	(13)	–	(25)
Gains and losses on settlements	–	13	–	–
Net interest expense (income)	(22)	8	65	66
Remeasurements of other long term benefits	–	–	13	(4)
Administrative expense	16	15	–	–
Defined benefit pension expense	\$ 292	\$ 382	\$ 117	\$ 71
Defined contribution pension expense	212	185	–	–
	\$ 504	\$ 567	\$ 117	\$ 71

Service costs for the year ended October 31, 2019 totalled \$293 million (October 31, 2018 – \$354 million) for pension plans in Canada and \$5 million (October 31, 2018 – \$(8) million) for International plans. Net interest expense (income) for the year ended October 31, 2019 totalled \$(21) million (October 31, 2018 – \$4 million) for pension plans in Canada and \$(1) million (October 31, 2018 – \$4 million) for International plans.

Pension and other post-employment benefit remeasurements

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

(Millions of Canadian dollars)	For the year ended			
	Defined benefit pension plans		Other post-employment benefit plans	
	October 31 2019	October 31 2018	October 31 2019	October 31 2018
Actuarial (gains) losses:				
Changes in demographic assumptions	\$ (4)	\$ (164)	\$ (11)	\$ (65)
Changes in financial assumptions	1,977	(828)	186	(134)
Experience adjustments	59	(22)	(22)	(35)
Return on plan assets (excluding interest based on discount rate)	(910)	268	–	–
	\$ 1,122	\$ (746)	\$ 153	\$ (234)

Remeasurements recorded in OCI for the year ended October 31, 2019 were losses of \$1,102 million (October 31, 2018 – gains of \$633 million) for pension plans in Canada and losses of \$20 million (October 31, 2018 – gains of \$113 million) for International plans.

Investment policy and strategies

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

- the nature of the underlying benefit obligations, including the duration and term profile of the liabilities;
- the member demographics, including expectations for normal retirements, terminations, and deaths;
- the financial position of the pension plans;
- the diversification benefits obtained by the inclusion of multiple asset classes; and
- expected asset returns, including asset and liability correlations, along with liquidity requirements of the plan.

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

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

During the year ended October 31, 2019, the management of defined benefit pension investments focused on increased allocation to risk reducing investments and strategies, maintaining diversification, while striving to improve expected investment return. Over time, an increasing allocation to debt securities is being used to reduce asset/liability duration mismatch and hence variability of the plan's funded status due to interest rate movement. Longer maturity debt securities, given their price sensitivity to movements in interest rates, are considered to be a good economic hedge to risk associated with the plan's liabilities, which are discounted using predominantly long maturity bond interest rates as inputs.

Asset allocation of defined benefit pension plans (1)

	As at					
	October 31, 2019			October 31, 2018		
(Millions of Canadian dollars, except percentages)	Fair value	Percentage of total plan assets	Quoted in active market (2)	Fair value	Percentage of total plan assets	Quoted in active market (2)
Equity securities						
Domestic	\$ 1,544	10%	100%	\$ 1,259	10%	100%
Foreign	3,215	22	98	3,243	24	99
Debt securities						
Domestic government bonds	3,014	21	–	2,643	19	–
Foreign government bonds	396	3	–	288	2	–
Corporate and other bonds	3,458	23	–	3,265	24	–
Alternative investments and other	3,158	21	13	2,866	21	15
	\$ 14,785	100%	35%	\$ 13,564	100%	36%

(1) The asset allocation is based on the underlying investments held directly and indirectly through the funds as this is how we manage our investment policy and strategies.

(2) If our assessment of whether or not an asset was quoted in an active market was based on direct investments, 36% of our total plan assets would be classified as quoted in an active market (October 31, 2018 – 40%).

The allocation of equity securities in our pension plans in Canada is 33% (October 31, 2018 – 33%) and that of our International plans is 16% (October 31, 2018 – 23%). The allocation of debt securities in our pension plans in Canada is 47% (October 31, 2018 – 46%) and that of our International plans is 44% (October 31, 2018 – 42%). The allocation of alternative investments and other in our pension plans in Canada is 20% (October 31, 2018 – 21%) and that of our International plans is 40% (October 31, 2018 – 35%).

As at October 31, 2019, the plan assets include 1 million (October 31, 2018 – 1 million) of our common shares with a fair value of \$104 million (October 31, 2018 – \$95 million) and \$57 million (October 31, 2018 – \$49 million) of our debt securities. For the year ended October 31, 2019, dividends received on our common shares held in the plan assets were \$4 million (October 31, 2018 – \$4 million).

Maturity profile

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

	As at October 31, 2019		
	Canada	International	Total
(Millions of Canadian dollars, except participants and years)			
Number of plan participants	69,084	7,635	76,719
Actual benefit payments 2019	\$ 551	\$ 50	\$ 601
Benefits expected to be paid 2020	610	50	660
Benefits expected to be paid 2021	630	52	682
Benefits expected to be paid 2022	650	52	702
Benefits expected to be paid 2023	670	52	722
Benefits expected to be paid 2024	690	53	743
Benefits expected to be paid 2025-2029	3,709	258	3,967
Weighted average duration of defined benefit payments	16.0 years	19.2 years	16.2 years

Significant assumptions

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

Discount rate

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

Rate of increase in future compensation

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

Healthcare cost trend rates

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

Weighted average assumptions to determine benefit obligation

	As at			
	Defined benefit pension plans		Other post-employment benefit plans	
	October 31 2019	October 31 2018	October 31 2019	October 31 2018
Discount rate	3.0%	4.0%	3.3%	4.1%
Rate of increase in future compensation	3.3%	3.3%	n.a.	n.a.
Healthcare cost trend rates (1)				
– Medical	n.a.	n.a.	3.5%	3.5%
– Dental	n.a.	n.a.	3.1%	3.1%

(1) For our other post-employment benefit plans, the assumed trend rates used to measure the expected benefit costs of the defined benefit obligations are also the ultimate trend rates.

n.a. not applicable

Mortality assumptions

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

	As at							
	October 31, 2019				October 31, 2018			
	Life expectancy at 65 for a member currently at				Life expectancy at 65 for a member currently at			
	Age 65		Age 45		Age 65		Age 45	
(In years)	Male	Female	Male	Female	Male	Female	Male	Female
Country								
Canada	23.7	24.1	24.7	25.0	23.7	24.1	24.7	25.0
United States	20.6	22.6	22.2	24.1	20.6	22.7	22.3	24.2
United Kingdom	23.5	25.2	25.1	27.0	23.4	25.2	25.0	26.9

Sensitivity analysis

Assumptions adopted can have a significant effect on the value of the obligations for defined benefit pension and other post-employment benefit plans and are based on historical experience and market inputs. The increase (decrease) in obligation in the following table has been determined for key assumptions assuming all other assumptions are held constant. In practice, this is unlikely to occur, as changes in some of the assumptions may be correlated. The following table presents the sensitivity analysis of key assumptions for 2019.

	Increase (decrease) in obligation	
	Defined benefit pension plans	Other post-employment benefit plans
(Millions of Canadian dollars)		
Discount rate		
Impact of 100 bps increase in discount rate	\$ (2,248)	\$ (239)
Impact of 100 bps decrease in discount rate	2,834	304
Rate of increase in future compensation		
Impact of 50 bps increase in rate of increase in future compensation	66	1
Impact of 50 bps decrease in rate of increase in future compensation	(70)	(1)
Mortality rate		
Impact of an increase in longevity by one additional year	425	36
Healthcare cost trend rate		
Impact of 100 bps increase in healthcare cost trend rate	n.a.	81
Impact of 100 bps decrease in healthcare cost trend rate	n.a.	(68)

n.a. not applicable

Note 18 Other liabilities

(Millions of Canadian dollars)	As at	
	October 31 2019	October 31 2018
Cash collateral	\$ 16,195	\$ 13,907
Accounts payable and accrued expenses	1,598	1,531
Payroll and related compensation	7,416	7,073
Payable to brokers, dealers and clients	3,241	4,078
Negotiable instruments	1,671	1,693
Accrued interest payable (1)	3,496	3,072
Deferred income	2,563	2,259
Taxes payable	2,202	2,071
Precious metals certificates	431	346
Dividends payable	1,567	1,482
Insurance related liabilities	387	364
Deferred income taxes	82	84
Provisions	581	507
Employee benefit liabilities	2,699	1,902
Commodity liabilities	8,487	7,315
Other	5,521	5,438
	\$ 58,137	\$ 53,122

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

Note 19 Subordinated debentures

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

Maturity	Earliest par value redemption date	Interest rate	Denominated foreign currency (millions)	As at	
				October 31 2019	October 31 2018
August 12, 2019 (1)		9.00%	US\$75	\$ –	\$ 103
July 15, 2022		5.38%	US\$150	206	208
June 8, 2023		9.30%		110	110
July 17, 2024 (2), (3)	July 17, 2019	3.04%		–	998
December 6, 2024	December 6, 2019	2.99% (4)		1,999	1,978
June 4, 2025 (3)	June 4, 2020	2.48% (4)		997	988
January 20, 2026 (3)	January 20, 2021	3.31% (5)		1,483	1,443
January 27, 2026 (3)		4.65%	US\$1,500	2,023	1,813
September 29, 2026 (3)	September 29, 2021	3.45% (6)		1,009	988
November 1, 2027	November 1, 2022	4.75%	TT\$300	59	59
July 25, 2029 (3)	July 25, 2024	2.74% (7)		1,486	–
October 1, 2083	Any interest payment date	(8)		224	224
June 29, 2085	Any interest payment date	(9)	US\$174	229	229
				\$ 9,825	\$ 9,141
Deferred financing costs				(10)	(10)
				\$ 9,815	\$ 9,131

The terms and conditions of the debentures are as follows:

- All US\$75 million outstanding subordinated debentures were redeemed on August 12, 2019 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date.
- All \$1,000 million outstanding subordinated debentures were redeemed on July 17, 2019 for 100% of their principal amount plus interest accrued to, but excluding, the redemption date.
- 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.
- Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.10% above the 3-month Canadian Dollar Offered Rate (CDOR).
- Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 2.35% above the 3-month CDOR.
- Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 1.12% above the 3-month CDOR.
- Interest at stated interest rate until earliest par value redemption date, and thereafter at a rate of 0.98% above the 3-month CDOR.
- Interest at a rate of 40 basis points above the 30-day Bankers' Acceptance rate.
- Interest at a rate of 25 basis points above the U.S. dollar 3-month London Interbank Mean Rate (LIMEAN). In the event of a reduction of the annual dividend we declare on our common shares, the interest payable on the debentures is reduced pro rata to the dividend reduction and the interest reduction is payable with the proceeds from the sale of newly issued common shares.

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

Maturity schedule

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

<i>(Millions of Canadian dollars)</i>	October 31 2019
Within 1 year	\$ –
1 to 5 years	316
5 to 10 years	9,056
Thereafter	453
	\$ 9,825

Note 20 Trust capital securities

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

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

Note 21 Equity

Share capital

Authorized share capital

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

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

Outstanding share capital

The following table details our common and preferred shares outstanding.

	As at and for the year ended					
	October 31, 2019			October 31, 2018		
	Number of shares (thousands)	Amount	Dividends declared per share	Number of shares (thousands)	Amount	Dividends declared per share
(Millions of Canadian dollars, except the number of shares and dividends per share)						
Common shares issued						
Balance at beginning of period	1,439,029	\$ 17,635		1,452,898	\$ 17,730	
Issued in connection with share-based compensation plans (1)	1,900	136		1,466	92	
Purchased for cancellation (2)	(10,251)	(126)		(15,335)	(187)	
Balance at end of period	1,430,678	\$ 17,645	\$ 4.07	1,439,029	\$ 17,635	\$ 3.77
Treasury shares – common shares						
Balance at beginning of period	(235)	\$ (18)		(363)	\$ (27)	
Purchases	(54,263)	(5,380)		(53,964)	(5,470)	
Sales	53,916	5,340		54,092	5,479	
Balance at end of period	(582)	\$ (58)		(235)	\$ (18)	
Common shares outstanding	1,430,096	\$ 17,587		1,438,794	\$ 17,617	
Preferred shares issued						
First preferred (3)						
Non-cumulative, fixed rate						
Series W	12,000	\$ 300	\$ 1.23	12,000	\$ 300	\$ 1.23
Series AA	12,000	300	1.11	12,000	300	1.11
Series AC	8,000	200	1.15	8,000	200	1.15
Series AD (4)	–	–	–	10,000	250	1.13
Series AE	10,000	250	1.13	10,000	250	1.13
Series AF	8,000	200	1.11	8,000	200	1.11
Series AG	10,000	250	1.13	10,000	250	1.13
Series BH	6,000	150	1.23	6,000	150	1.23
Series BI	6,000	150	1.23	6,000	150	1.23
Series BJ	6,000	150	1.31	6,000	150	1.31
Non-cumulative, 5-Year Rate Reset						
Series AJ (5)	–	–	0.22	13,579	339	0.88
Series AL (5)	–	–	0.27	12,000	300	1.07
Series AZ	20,000	500	0.96	20,000	500	1.00
Series BB	20,000	500	0.96	20,000	500	0.98
Series BD	24,000	600	0.90	24,000	600	0.90
Series BF	12,000	300	0.90	12,000	300	0.90
Series BK	29,000	725	1.38	29,000	725	1.38
Series BM	30,000	750	1.38	30,000	750	1.38
Series BO (6)	14,000	350	1.27	–	–	–
Non-cumulative, floating rate						
Series AK (5)	–	–	0.23	2,421	61	0.78
Non-cumulative, fixed rate/floating rate						
Series C-2	20	31	US\$ 67.50	20	31	US\$ 67.50
	227,020	\$ 5,706		251,020	\$ 6,306	
Treasury shares – preferred shares						
Balance at beginning of period (7)	114	\$ 3		6	\$ –	
Purchases	(8,021)	(184)		(10,215)	(256)	
Sales	7,941	182		10,323	259	
Balance at end of period (7)	34	\$ 1		114	\$ 3	
Preferred shares outstanding	227,054	\$ 5,707		251,134	\$ 6,309	

(1) Includes fair value adjustments to stock options of \$29 million (2018 – \$15 million).

(2) During the year ended October 31, 2019, we purchased common shares for cancellation at an average cost of \$100.41 per share with a book value of \$12.29 per share. During the year ended October 31, 2018, we purchased common shares for cancellation at an average cost of \$99.29 per share with a book value of \$12.22 per share.

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

(4) On November 24, 2018, we redeemed all 10 million issued and outstanding Non-Cumulative First Preferred Shares, Series AD, for cash at a redemption price of \$25 per share.

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

(6) On November 2, 2018, we issued 14 million Non-Cumulative 5-year Rate Reset First Preferred Shares, Series BO, totalling \$350 million.

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

Significant terms and conditions of preferred shares

As at October 31, 2019	Current Annual Yield	Premium	Current Dividend per share (1)	Earliest redemption date (2)	Issue Date	Redemption price (2), (3)
Preferred shares						
First preferred						
Non-cumulative, fixed rate						
Series W (4)	4.90%		\$.306250	February 24, 2010	January 31, 2005	\$ 25.00
Series AA	4.45%		.278125	May 24, 2011	April 4, 2006	25.00
Series AC	4.60%		.287500	November 24, 2011	November 1, 2006	25.00
Series AE	4.50%		.281250	February 24, 2012	January 19, 2007	25.00
Series AF	4.45%		.278125	May 24, 2012	March 14, 2007	25.00
Series AG	4.50%		.281250	May 24, 2012	April 26, 2007	25.00
Series BH (5)	4.90%		.306250	November 24, 2020	June 5, 2015	26.00
Series BI (5)	4.90%		.306250	November 24, 2020	July 22, 2015	26.00
Series BJ (5)	5.25%		.328125	February 24, 2021	October 2, 2015	26.00
Non-cumulative, 5-Year						
Rate Reset (6)						
Series AZ (5)	3.70%	2.21%	.231250	May 24, 2019	January 30, 2014	25.00
Series BB (5)	3.65%	2.26%	.228125	August 24, 2019	June 3, 2014	25.00
Series BD (5)	3.60%	2.74%	.225000	May 24, 2020	January 30, 2015	25.00
Series BF (5)	3.60%	2.62%	.225000	November 24, 2020	March 13, 2015	25.00
Series BK (5)	5.50%	4.53%	.343750	May 24, 2021	December 16, 2015	25.00
Series BM (5)	5.50%	4.80%	.343750	August 24, 2021	March 7, 2016	25.00
Series BO (5)	4.80%	2.38%	.300000	February 24, 2024	November 2, 2018	25.00
Non-cumulative, fixed rate/ floating rate						
Series C-2 (7)	6.75%	4.052%	US\$16.875000	November 7, 2023	November 2, 2015	US\$1,000.00

- (1) Non-cumulative preferential dividends of each Series are payable quarterly, as and when declared by the Board of Directors, on or about the 24th day (7th day for Series C-2) of February, May, August and November.
- (2) Subject to the consent of OSFI and the requirements of the *Bank Act* (Canada), we may, on or after the dates specified above, redeem First Preferred Shares. In the case of Series AZ, BB, BD, BF, BK, BM, and BO, these may be redeemed for cash at a price per share of \$25 if redeemed on the earliest redemption date and on the same date every fifth year thereafter. In the case of Series W, AA, AC, AE, AF, AG, BH, BI and BJ, these may be redeemed for cash at a price per share of \$26 if redeemed during the 12 months commencing on the earliest redemption date and decreasing by \$0.25 each 12-month period thereafter to a price per share of \$25 if redeemed four years from the earliest redemption date or thereafter. Series C-2 may be redeemed at a price of US\$1,000 on the earliest redemption date and any dividend payment date thereafter.
- (3) Subject to the consent of OSFI and the requirements of the *Bank Act* (Canada), we may purchase the First Preferred Shares of each Series for cancellation at the lowest price or prices at which, in the opinion of the Board of Directors, such shares are obtainable.
- (4) Subject to the approval of the Toronto Stock Exchange, we may, on or after February 24, 2010, convert First Preferred Shares Series W into our common shares. First Preferred Shares Series W may be converted into that number of common shares determined by dividing the current redemption price by the greater of \$2.50 and 95% of the weighted average trading price of common shares at such time.
- (5) The preferred shares include NVCC provisions, necessary for the shares to qualify as Tier 1 regulatory capital under Basel III. NVCC provisions require the conversion of the instrument into a variable number of common shares in the event that OSFI deems the Bank non-viable or a federal or provincial government in Canada publicly announces that the Bank has accepted or agreed to accept a capital injection. In such an event, each preferred share is convertible into common shares pursuant to an automatic conversion formula with a multiplier of 1 and with a conversion price based on the greater of: (i) a floor price of \$5 and (ii) the current market price of our common shares based on the volume weighted average trading price of our common shares on the Toronto Stock Exchange. The number of shares issued is determined by dividing the preferred share value (\$25 plus declared and unpaid dividends) by the conversion price.
- (6) The dividend rate will reset on the earliest redemption date and every fifth year thereafter at a rate equal to the 5-year Government of Canada bond yield plus the premium indicated. The holders have the option to convert their shares into Non-Cumulative floating rate First Preferred Shares subject to certain conditions on the earliest redemption date and every fifth year thereafter at a rate equal to the three-month Government of Canada Treasury Bill rate plus the premium indicated.
- (7) The dividend rate will change on the earliest redemption date at a rate equal to the 3-month LIBOR plus the premium indicated. Series C-2 do not qualify as Tier 1 regulatory capital.

Restrictions on the payment of dividends

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

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

Dividend reinvestment plan

Our dividend reinvestment plan (DRIP) provides common and preferred shareholders with a means to receive additional common shares rather than cash dividends. The plan is only open to shareholders residing in Canada or the United States. The requirements of our DRIP are satisfied through either open market share purchases or shares issued from treasury. During 2019 and 2018, the requirements of our DRIP were satisfied through open market share purchases.

Shares available for future issuances

As at October 31, 2019, 42.9 million common shares are available for future issue relating to our DRIP and potential exercise of stock options and awards outstanding. In addition, we may issue up to 38.9 million common shares from treasury under the RBC Umbrella Savings and Securities Purchase Plan that was approved by shareholders on February 26, 2009.

Stock option plans

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

The compensation expense recorded for the year ended October 31, 2019, in respect of the stock option plans was \$6 million (October 31, 2018 – \$6 million). The compensation expense related to non-vested options was \$3 million at October 31, 2019 (October 31, 2018 – \$3 million), to be recognized over the weighted average period of 1.8 years (October 31, 2018 – 1.1 years).

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

A summary of our stock option activity and related information

	For the year ended			
	October 31, 2019		October 31, 2018	
	Number of options (thousands)	Weighted average exercise price (1)	Number of options (thousands)	Weighted average exercise price (1)
(Canadian dollars per share except share amounts)				
Outstanding at beginning of period	7,770	\$ 71.40	8,566	\$ 64.96
Granted	1,090	96.55	773	102.33
Exercised (2), (3)	(1,900)	55.05	(1,440)	50.42
Forfeited in the period	(10)	54.99	(129)	78.12
Outstanding at end of period	6,950	\$ 79.88	7,770	\$ 71.40
Exercisable at end of period	2,980	\$ 64.24	3,726	\$ 55.82

- (1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rates as of October 31, 2019 and October 31, 2018. For foreign currency-denominated options exercised during the year, the weighted average exercise prices are translated using exchange rates as at the settlement date.
- (2) Cash received for options exercised during the year was \$105 million (October 31, 2018 – \$73 million) and the weighted average share price at the date of exercise was \$103.15 (October 31, 2018 – \$101.81).
- (3) New shares were issued for all stock options exercised in 2019 and 2018.

Options outstanding as at October 31, 2019 by range of exercise price

	Options outstanding			Options exercisable	
	Number outstanding (thousands)	Weighted average exercise price (1)	Weighted average remaining contractual life (years)	Number exercisable (thousands)	Weighted average exercise price (1)
(Canadian dollars per share except share amounts and years)					
\$36.46 – \$52.23	704	\$ 45.63	2.35	704	\$ 45.63
\$52.60 – \$69.17	907	60.47	3.15	907	60.47
\$73.14 – \$76.68	1,490	74.57	5.92	818	74.76
\$78.59 – \$90.23	1,986	87.00	6.49	551	78.59
\$96.55 – \$102.33	1,863	98.95	8.70	–	–
	6,950	\$ 79.88	6.10	2,980	\$ 64.24

- (1) The weighted average exercise prices reflect the conversion of foreign currency-denominated options at the exchange rate as of October 31, 2019.

The weighted average fair value of options granted during the year ended October 31, 2019 was estimated at \$5.61 (October 31, 2018 – \$6.66). This was determined by applying the Black-Scholes model on the date of grant, taking into account the specific terms and conditions under which the options are granted, such as the vesting period and expected share price volatility estimated by considering the historic average share price volatility over a historical period corresponding to the expected option life. The following assumptions were used to determine the fair value of options granted:

Weighted average assumptions

	For the year ended	
	October 31 2019	October 31 2018
(Canadian dollars per share except percentages and years)		
Share price at grant date	\$ 94.09	\$ 101.83
Risk-free interest rate	2.01%	1.71%
Expected dividend yield	3.77%	3.66%
Expected share price volatility	12%	13%
Expected life of option	6 Years	6 Years

Employee savings and share ownership plans

We offer many employees an opportunity to own our common shares through savings and share ownership plans. Under these plans, the employees can generally contribute between 1% and 10% of their annual salary or benefit base for commission-based employees. For each contribution between 1% and 6%, we will match 50% of the employee contributions in our common shares. For the RBC Dominion Securities Savings Plan, our maximum annual contribution is \$4,500 per employee. For the RBC U.K. Share Incentive Plan, our maximum annual contribution is £1,500 per employee. For the year ended October 31, 2019, we contributed \$112 million (October 31, 2018 – \$97 million), under the terms of these plans, towards the purchase of our common shares. As at October 31, 2019, an aggregate of 35 million common shares were held under these plans (October 31, 2018 – 35 million common shares).

Deferred share and other plans

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

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

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

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

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

Units granted under deferred share and other plans

	For the year ended			
	October 31, 2019		October 31, 2018	
(Units and per unit amounts)	Units granted (thousands)	Weighted average fair value per unit	Units granted (thousands)	Weighted average fair value per unit
Deferred share unit plans	495	\$ 99.69	376	\$ 100.71
Deferred bonus plan	3,423	105.12	4,820	95.18
Performance deferred share award plans	2,471	96.39	2,099	101.55
Deferred compensation plans	116	94.06	91	103.55
Other share-based plans	1,210	96.28	978	101.48
	7,715	\$ 100.42	8,364	\$ 97.85

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

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

Obligations under deferred share and other plans

	As at			
	October 31, 2019		October 31, 2018	
(Millions of Canadian dollars except units)	Units (thousands)	Carrying amount	Units (thousands)	Carrying amount
Deferred share unit plans	5,288	\$ 562	4,631	\$ 446
Deferred bonus plan	8,820	937	10,347	990
Performance deferred share award plans	5,621	597	5,892	565
Deferred compensation plans (1)	3,072	326	3,299	317
Other share-based plans	1,787	185	2,140	202
	24,588	\$ 2,607	26,309	\$ 2,520

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

Note 22 Share-based compensation (continued)

Compensation expenses recognized under deferred share and other plans

	For the year ended	
	October 31 2019	October 31 2018
(Millions of Canadian dollars)		
Deferred share unit plans	\$ 77	\$ 6
Deferred bonus plan	274	139
Performance deferred share award plans	294	190
Deferred compensation plans	250	80
Other share-based plans	106	78
	\$ 1,001	\$ 493

Note 23 Income taxes

Components of tax expense

	For the year ended	
	October 31 2019	October 31 2018
(Millions of Canadian dollars)		
Income taxes (recoveries) in Consolidated Statements of Income		
Current tax		
Tax expense for current year	\$ 3,256	\$ 3,351
Adjustments for prior years	(26)	(212)
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period	(31)	(11)
	3,199	3,128
Deferred tax		
Origination and reversal of temporary difference	(114)	28
Effects of changes in tax rates	29	148
Adjustments for prior years	(57)	152
Recoveries arising from previously unrecognized tax loss, tax credit or temporary difference of a prior period, net	(14)	(127)
	(156)	201
	3,043	3,329
Income taxes (recoveries) in Consolidated Statements of Comprehensive Income and Changes in Equity		
Other comprehensive income		
Net unrealized gains (losses) on debt securities and loans at fair value through other comprehensive income	51	12
Provision for credit losses recognized in income	–	(5)
Reclassification of net losses (gains) on debt securities and loans at fair value through other comprehensive income to income	(60)	(52)
Unrealized foreign currency translation gains (losses)	2	2
Net foreign currency translation gains (losses) from hedging activities	2	(77)
Reclassification of losses (gains) on net investment hedging activities to income	1	–
Net gains (losses) on derivatives designated as cash flow hedges	(200)	84
Reclassification of losses (gains) on derivatives designated as cash flow hedges to income	(50)	8
Remeasurements of employee benefit plans	(333)	256
Net fair value change due to credit risk on financial liabilities designated as fair value through profit or loss	18	45
Net gains (losses) on equity securities designated at fair value through other comprehensive income	5	(5)
Share-based compensation awards	(9)	15
	(573)	283
Total income taxes	\$ 2,470	\$ 3,612

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

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

Reconciliation to statutory tax rate

(Millions of Canadian dollars, except for percentage amounts)	For the year ended			
	October 31, 2019		October 31, 2018	
Income taxes at Canadian statutory tax rate	\$ 4,217	26.5%	\$ 4,176	26.5%
Increase (decrease) in income taxes resulting from				
Lower average tax rate applicable to subsidiaries	(815)	(5.1)	(752)	(4.8)
Tax-exempt income from securities	(310)	(1.9)	(285)	(1.8)
Tax rate change	29	0.1	148	0.9
Other	(78)	(0.5)	42	0.3
Income taxes in Consolidated Statements of Income / effective tax rate	\$ 3,043	19.1%	\$ 3,329	21.1%

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

Significant components of deferred tax assets and liabilities

(Millions of Canadian dollars)	As at and for the year ended October 31, 2019					
	Net asset beginning of period	Change through equity	Change through profit or loss	Exchange rate differences	Other	Net asset end of period
Net deferred tax asset/(liability)						
Allowance for credit losses	\$ 695	\$ –	\$ 23	\$ (2)	\$ –	\$ 716
Deferred compensation	1,033	9	197	7	–	1,246
Business realignment charges	3	–	7	–	–	10
Tax loss and tax credit carryforwards	203	–	(10)	–	9	202
Deferred income	(48)	–	(11)	(1)	–	(60)
Financial instruments measured at fair value through other comprehensive income	(8)	(33)	(1)	(1)	–	(43)
Premises and equipment and intangibles	(858)	–	(4)	(4)	(3)	(869)
Deferred expense	55	36	(47)	1	–	45
Pension and post-employment related	295	339	(6)	3	–	631
Other	21	3	8	(3)	–	29
	\$ 1,391	\$ 354	\$ 156	\$ –	\$ 6	\$ 1,907
Comprising						
Deferred tax assets	\$ 1,475					\$ 1,989
Deferred tax liabilities	(84)					(82)
	\$ 1,391					\$ 1,907

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

The tax loss and tax credit carryforwards amount of deferred tax assets relates to losses and tax credits in our Canadian, U.S., Caribbean, and Japanese operations. Deferred tax assets of \$202 million were recognized at October 31, 2019 (October 31, 2018 – \$203 million) in respect of tax losses and tax credits incurred in current or preceding years for which recognition is dependent on the projection of future taxable profits. Management's forecasts support the assumption that it is probable that the results of future operations will generate sufficient taxable income to utilize the deferred tax assets. The forecasts rely on continued liquidity and capital support to our business operations, including tax planning strategies implemented in relation to such support.

Note 23 Income taxes (continued)

As at October 31, 2019, unused tax losses, tax credits and deductible temporary differences of \$413 million, \$365 million and \$nil (October 31, 2018 – \$443 million, \$426 million and \$39 million) available to be offset against potential tax adjustments or future taxable income were not recognized as deferred tax assets. This amount includes unused tax losses of \$1 million which expire within one year (October 31, 2018 – \$4 million), \$7 million which expire in two to four years (October 31, 2018 – \$2 million) and \$405 million which expire after four years (October 31, 2018 – \$437 million). There are no tax credits that will expire in one year (October 31, 2018 – \$nil), \$60 million that will expire in two to four years (October 31, 2018 – \$45 million) and \$305 million that will expire after four years (October 31, 2018 – \$381 million). In addition, there are no deductible temporary differences that will expire in one year (October 31, 2018 – \$1 million), nor that will expire in two to four years (October 31, 2018 – \$1 million) or that will expire after four years (October 31, 2018 – \$37 million).

The amount of temporary differences associated with investments in subsidiaries, branches and associates and interests in joint ventures for which deferred tax liabilities have not been recognized in the parent bank is \$17.9 billion as at October 31, 2019 (October 31, 2018 – \$14.6 billion).

Tax examinations and assessments

We have received reassessments during the year from the Canada Revenue Agency (CRA), in respect of the 2014, 2013 and 2012 taxation years, which suggest that Royal Bank of Canada owes additional income taxes of approximately \$756 million as they denied the deductibility of certain dividends. These are consistent with the reassessments received for taxation years 2011, 2010, and 2009 for approximately \$434 million of additional income taxes and interest in respect of the same matter. These amounts represent the maximum additional taxes owing for those years.

Legislative amendments introduced in the 2015 Canadian Federal Budget resulted in disallowed deduction of dividends from transactions with Taxable Canadian Corporations including those hedged with Tax Indifferent Investors, namely pension funds and non-resident entities with prospective application effective May 1, 2017. The dividends to which the reassessments relate include both dividends in transactions similar to those which are the target of the 2015 legislative amendments and dividends which are unrelated to the legislative amendments.

It is possible that the CRA will reassess us for significant additional income tax for subsequent years on the same basis. In all cases, we are confident that our tax filing position was appropriate and intend to defend ourselves vigorously.

U.S. Tax Reform

The majority of the provisions in the U.S. Tax Cuts and Jobs Act legislation (U.S. Tax Reform), which was passed in December 2017, took effect at the beginning of calendar year 2018 or for fiscal years beginning in 2018. The changes include a reduction in the corporate income tax rate from 35% to 21% which resulted in a write-down of \$178 million (US\$142 million), primarily related to net deferred tax assets in the prior year.

Note 24 Earnings per share

	For the year ended	
	October 31 2019	October 31 2018
(Millions of Canadian dollars, except share and per share amounts)		
Basic earnings per share		
Net income	\$ 12,871	\$ 12,431
Preferred share dividends	(269)	(285)
Net income attributable to non-controlling interests	(11)	(31)
Net income available to common shareholders	12,591	12,115
Weighted average number of common shares (in thousands)	1,434,779	1,443,894
Basic earnings per share (in dollars)	\$ 8.78	\$ 8.39
Diluted earnings per share		
Net income available to common shareholders	\$ 12,591	\$ 12,115
Dilutive impact of exchangeable shares	15	15
Net income available to common shareholders including dilutive impact of exchangeable shares	12,606	12,130
Weighted average number of common shares (in thousands)	1,434,779	1,443,894
Stock options (1)	2,011	2,691
Issuable under other share-based compensation plans	742	742
Exchangeable shares (2)	3,150	3,158
Average number of diluted common shares (in thousands)	1,440,682	1,450,485
Diluted earnings per share (in dollars)	\$ 8.75	\$ 8.36

(1) The dilutive effect of stock options was calculated using the treasury stock method. When the exercise price of options outstanding is greater than the average market price of our common shares, the options are excluded from the calculation of diluted earnings per share. For the year ended October 31, 2019, an average of 767,225 outstanding options with an average exercise price of \$102.33 were excluded from the calculation of diluted earnings per share. For the year ended October 31, 2018, an average of 657,353 outstanding options with an average exercise price of \$102.33 were excluded from the calculation of diluted earnings per share.

(2) Includes exchangeable preferred shares.

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	
	October 31 2019	October 31 2018
<i>(Millions of Canadian dollars)</i>		
Financial guarantees		
Financial standby letters of credit	\$ 16,608	\$ 15,502
Commitments to extend credit		
Backstop liquidity facilities	36,305	36,267
Credit enhancements	1,692	2,128
Documentary and commercial letters of credit	268	268
Other commitments to extend credit	225,911	223,954
Other credit-related commitments		
Securities lending indemnifications	91,625	107,239
Performance guarantees	7,061	6,955
Other	787	391

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

Financial guarantees

Financial standby letters of credit

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

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

Commitments to extend credit

Backstop liquidity facilities

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

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

Credit enhancements

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

Documentary and commercial letters of credit

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

Other commitments to extend credit

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

Other credit-related commitments

Securities lending indemnifications

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

Performance guarantees

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

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

Indemnifications

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

Uncommitted amounts

Uncommitted amounts represent undrawn credit facilities for which we have the ability to unilaterally withdraw the credit extended to the borrower at any time. These include both retail and commercial commitments. As at October 31, 2019, the total balance of uncommitted amounts was \$287 billion (October 31, 2018 – \$264 billion).

Other commitments

We act as underwriter for certain new issuances under which we alone or together with a syndicate of financial institutions purchase the new issue for resale to investors. In connection with these activities, our commitments were \$35 million as at October 31, 2019, (October 31, 2018 – \$141 million).

We invest in private companies, directly or through third party investment funds, including Small Business Investment Companies, real estate funds and Low Income Housing Tax Credit funds. These funds are generally structured as closed-end limited partnerships wherein we hold a limited partner interest. For the year ended October 31, 2019, we have unfunded commitments of \$684 million (October 31, 2018 – \$948 million) representing the aggregate amount of cash we are obligated to be contributed as capital to these partnerships under the terms of the relevant contracts.

Pledged assets and collateral

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

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

We are also required to provide intraday pledges to the Bank of Canada when we use the Large Value Transfer System (LVTS), which is a real-time electronic wire transfer system that continuously processes all Canadian dollar large-value or time-critical payments throughout the day. The pledged assets earmarked for LVTS activities are normally released back to us at the end of the settlement cycle each day. Therefore, the pledged assets amount is not included in the table below. For the year ended October 31, 2019, we had on average \$4.9 billion of assets pledged intraday to the Bank of Canada on a daily basis (October 31, 2018 – \$4.0 billion). There are infrequent occasions where we are required to take an overnight advance from the Bank of Canada to cover a settlement requirement, in which case an equivalent value of the pledged assets would be used to secure the advance. There were no overnight advances taken on October 31, 2019 and October 31, 2018.

Assets pledged against liabilities and collateral assets held or re-pledged

	As at	
	October 31 2019	October 31 2018
(Millions of Canadian dollars)		
Sources of pledged assets and collateral		
Bank assets		
Loans	\$ 80,542	\$ 79,798
Securities	55,544	48,993
Other assets	21,316	19,406
	157,402	148,197
Client assets (1)		
Collateral received and available for sale or re-pledging	448,338	402,187
Less: not sold or re-pledged	(49,325)	(53,590)
	399,013	348,597
	\$ 556,415	\$ 496,794
Uses of pledged assets and collateral		
Securities borrowing and lending	\$ 146,590	\$ 119,087
Obligations related to securities sold short	34,686	32,247
Obligations related to securities lent or sold under repurchase agreements	229,905	209,353
Securitization	47,254	49,997
Covered bonds	42,103	36,959
Derivative transactions	26,448	21,110
Foreign governments and central banks	5,963	5,058
Clearing systems, payment systems and depositories	4,804	4,006
Other	18,662	18,977
	\$ 556,415	\$ 496,794

(1) Primarily relates to Obligations related to securities lent or sold under repurchase agreements, Securities lent and Derivative transactions.

Lease commitments

Operating lease commitments

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

	As at			
	October 31, 2019		October 31, 2018	
(Millions of Canadian dollars)	Land and buildings	Equipment	Land and buildings	Equipment
Future minimum lease payments				
No later than one year	\$ 721	\$ 88	\$ 684	\$ 103
Later than one year and no later than five years	2,251	101	2,081	137
Later than five years	3,039	–	2,816	–
	6,011	189	5,581	240
Less: Future minimum sublease payments to be received	(25)	–	(11)	–
Net future minimum lease payments	\$ 5,986	\$ 189	\$ 5,570	\$ 240

Note 26 Legal and regulatory matters

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

London interbank offered rate (LIBOR) regulatory investigations and litigation

Royal Bank of Canada and other U.S. dollar panel banks have been named as defendants in private lawsuits filed in the U.S. with respect to the setting of U.S. dollar LIBOR including a number of class action lawsuits which have been consolidated before the U.S. District Court for the Southern District of New York. The complaints in those private lawsuits assert claims against us and other panel banks under various U.S. laws, including U.S. antitrust laws, the U.S. Commodity Exchange Act, and state law.

In addition to the LIBOR actions, in January 2019, a number of financial institutions, including Royal Bank of Canada and RBC Capital Markets LLC, were named in a purported class action in New York alleging violations of the U.S. antitrust laws and common law principles of unjust enrichment in the setting of LIBOR after the Intercontinental Exchange took over administration of the benchmark interest rate from the British Bankers' Association in 2014. Based on the facts currently known, it is not possible at this time for us to predict the ultimate outcome of these proceedings or the timing of their resolution.

Royal Bank of Canada Trust Company (Bahamas) Limited proceedings

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

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

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

Interchange fees litigation

Since 2011, seven proposed class actions have been commenced in Canada: *Bancroft-Snell v. Visa Canada Corporation, et al.*, *9085-4886 Quebec Inc. v. Visa Canada Corporation, et al.*, *Coburn and Watson's Metropolitan Home v. Bank of America Corporation, et al. (Watson)*, *Macaronies Hair Club and Laser Centre Inc. v. BofA Canada Bank, et al.*, *1023926 Alberta Ltd. v. Bank of America Corporation, et al.*, *The Crown & Hand Pub Ltd. v. Bank of America Corporation, et al.*, and *Hello Baby Equipment Inc. v. BofA Canada Bank, et al.* The defendants in each action are VISA Canada Corporation (Visa), MasterCard International Incorporated (MasterCard), Royal Bank of Canada and other financial institutions. The plaintiff class members are Canadian merchants who accept Visa and/or MasterCard branded credit cards for payment. The actions allege, among other things, that from March 2001 to the present, Visa and MasterCard conspired with their issuing banks and acquirers to set default interchange rates and merchant discount fees and that certain rules (Honour All Cards and No Surcharge) have the effect of increasing the merchant discount fees. The actions include claims of civil conspiracy, breach of the *Competition Act* (the Act) interference with economic relations and unjust enrichment. The claims seek unspecified general and punitive damages. In *Watson*, a decision to partially certify the action as a class proceeding was released on March 27, 2014, and was appealed. On August 19, 2015, the British Columbia Court of Appeal struck the plaintiff class representative's cause of action under section 45 of the Act and reinstated the plaintiff class representative's cause of action in civil conspiracy by unlawful means, among other rulings. In October 2016, the trial court in *Watson* denied a motion by the plaintiff to revive the stricken section 45 *Competition Act* claim, and also denied the plaintiff's motion to add new causes of action. The Supreme Court of Canada declined the B.C. class action plaintiffs' request to appeal the decision striking the plaintiffs' cause of action under section 45 of the *Competition Act*. The trial in the *Watson* proceeding has been rescheduled from October 14, 2019 to October 19, 2020.

In *9085-4886 Quebec Inc. v. Visa Canada Corporation, et al.*, the Quebec-court dismissed the *Competition Act* claims by Quebec merchants for post-2010 damages and certified a class action as to the remaining claims. The merchants appealed and on July 25, 2019, the Quebec Court of Appeal allowed the appeal to also authorize the merchants to proceed under section 45 of the *Competition Act* for claims after March 12, 2010 and for claims under section 49 of the *Competition Act*.

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

Foreign exchange matters

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

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

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

Other matters

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

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

Related parties

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

Key management personnel and Directors

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

Compensation of Key management personnel and Directors

	For the year ended	
	October 31 2019	October 31 2018
(Millions of Canadian dollars)		
Salaries and other short-term employee benefits (1)	\$ 26	\$ 34
Post-employment benefits (2)	2	2
Share-based payments	44	42
	\$ 72	\$ 78

(1) Includes the portion of the annual variable short-term incentive bonus that certain executives elected to receive in the form of DSUs. Refer to Note 22 for further details. Directors receive retainers but do not receive salaries and other short-term employee benefits.

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

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

	As at			
	October 31, 2019		October 31, 2018	
	No. of units held	Value	No. of units held	Value
(Millions of Canadian dollars, except number of units)				
Stock options (1)	2,372,714	\$ 51	2,154,835	\$ 37
Other non-option stock based awards (1)	1,481,096	157	1,440,002	138
RBC common and preferred shares	463,362	49	453,316	43
	4,317,172	\$ 257	4,048,153	\$ 218

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

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

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

As at October 31, 2019, total loans to KMP, Directors and their close family members were \$8 million (October 31, 2018 – \$10 million). We have no stage 3 allowance or provision for credit losses relating to these loans as at and for the years ended October 31, 2019 and October 31, 2018. No guarantees, pledges or commitments have been given to KMP, Directors or their close family members.

Joint ventures and associates

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

As at October 31, 2019, loans to joint ventures and associates were \$222 million (October 31, 2018 – \$225 million) and deposits from joint ventures and associates were \$180 million (October 31, 2018 – \$203 million). We have no stage 3 allowance or provision for credit losses relating to loans to joint ventures and associates as at and for the years ended October 31, 2019 and October 31, 2018. \$1 million of guarantees have been given to joint ventures and associates for the year ended October 31, 2019 (October 31, 2018 – \$1 million).

Other transactions, arrangements or agreements involving joint ventures and associates

	As at or for the year ended	
	October 31 2019	October 31 2018
(Millions of Canadian dollars)		
Commitments and other contingencies	\$ 430	\$ 621
Other fees received for services rendered	47	41
Other fees paid for services received	128	150

Composition of business segments

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

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

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

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

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

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

All other enterprise level activities that are not allocated to these five business segments, such as enterprise funding, securitizations, net charges associated with unattributed capital, and consolidation adjustments, including the elimination of the Taxable equivalent basis (Teb) gross-up amounts, are included in Corporate Support. Teb adjustments gross up income from certain tax-advantaged sources from Canadian taxable corporate dividends and U.S. tax credit investments recorded in Capital Markets to their effective tax equivalent value with the corresponding offset recorded in the provision for income taxes. Management believes that these Teb adjustments are necessary for Capital Markets to reflect how it is managed and enhances the comparability of revenue across our taxable and tax-advantaged sources. Our use of Teb adjustments may not be comparable to similarly adjusted amounts at other financial institutions. The Teb adjustment for the year ended October 31, 2019 was \$450 million (October 31, 2018 – \$542 million).

Geographic segments

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

Management reporting framework

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

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

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

(Millions of Canadian dollars)	For the year ended October 31, 2019									
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Canada	United States	Other International
Net interest income (2)	\$ 12,653	\$ 2,993	\$ –	\$ (44)	\$ 4,043	\$ 104	\$ 19,749	\$ 14,375	\$ 4,058	\$ 1,316
Non-interest income	5,212	9,150	5,710	2,389	4,245	(453)	26,253	14,037	6,411	5,805
Total revenue	17,865	12,143	5,710	2,345	8,288	(349)	46,002	28,412	10,469	7,121
Provision for credit losses	1,448	117	–	–	299	–	1,864	1,512	282	70
Insurance policyholder benefits, claims and acquisition expense	–	–	4,085	–	–	–	4,085	2,800	–	1,285
Non-interest expense	7,768	8,813	606	1,725	5,096	131	24,139	12,175	7,994	3,970
Net income (loss) before income taxes	8,649	3,213	1,019	620	2,893	(480)	15,914	11,925	2,193	1,796
Income taxes (recoveries)	2,247	663	213	145	227	(452)	3,043	2,748	133	162
Net income	\$ 6,402	\$ 2,550	\$ 806	\$ 475	\$ 2,666	\$ (28)	\$ 12,871	\$ 9,177	\$ 2,060	\$ 1,634
Non-interest expense includes:										
Depreciation and amortization	\$ 632	\$ 593	\$ 48	\$ 143	\$ 408	\$ –	\$ 1,824	\$ 1,176	\$ 486	\$ 162
Impairment of other intangibles	–	–	–	44	2	64	110	20	54	36
Total assets	\$ 481,720	\$ 106,579	\$ 19,012	\$ 144,406	\$ 634,313	\$ 42,905	\$ 1,428,935	\$ 753,142	\$ 399,792	\$ 276,001
Total assets include: Additions to premises and equipment and intangibles	\$ 408	\$ 565	\$ 44	\$ 142	\$ 491	\$ 621	\$ 2,271	\$ 1,326	\$ 669	\$ 276
Total liabilities	\$ 481,745	\$ 106,770	\$ 19,038	\$ 144,378	\$ 634,126	\$ (40,747)	\$ 1,345,310	\$ 669,543	\$ 399,800	\$ 275,967

(Millions of Canadian dollars)	For the year ended October 31, 2018									
	Personal & Commercial Banking	Wealth Management	Insurance	Investor & Treasury Services	Capital Markets (1)	Corporate Support (1)	Total	Canada	United States	Other International
Net interest income (2), (3)	\$ 11,776	\$ 2,602	\$ –	\$ 297	\$ 3,328	\$ (51)	\$ 17,952	\$ 13,076	\$ 3,616	\$ 1,260
Non-interest income (3)	5,140	8,324	4,279	2,294	5,070	(483)	24,624	12,698	6,080	5,846
Total revenue	16,916	10,926	4,279	2,591	8,398	(534)	42,576	25,774	9,696	7,106
Provision for credit losses	1,273	(15)	–	1	48	–	1,307	1,259	41	7
Insurance policyholder benefits, claims and acquisition expense	–	–	2,676	–	–	–	2,676	1,347	–	1,329
Non-interest expense	7,526	8,070	602	1,617	4,960	58	22,833	11,634	7,322	3,877
Net income (loss) before income taxes	8,117	2,871	1,001	973	3,390	(592)	15,760	11,534	2,333	1,893
Income taxes (recoveries)	2,089	606	226	232	613	(437)	3,329	2,661	402	266
Net income	\$ 6,028	\$ 2,265	\$ 775	\$ 741	\$ 2,777	\$ (155)	\$ 12,431	\$ 8,873	\$ 1,931	\$ 1,627
Non-interest expense includes:										
Depreciation and amortization	\$ 579	\$ 544	\$ 36	\$ 124	\$ 363	\$ –	\$ 1,646	\$ 1,102	\$ 389	\$ 155
Impairment of other intangibles	–	–	–	1	1	4	6	4	1	1
Total assets	\$ 453,879	\$ 93,063	\$ 16,210	\$ 136,030	\$ 590,950	\$ 44,602	\$ 1,334,734	\$ 680,276	\$ 384,921	\$ 269,537
Total assets include: Additions to premises and equipment and intangibles	\$ 279	\$ 431	\$ 45	\$ 187	\$ 442	\$ 579	\$ 1,963	\$ 1,196	\$ 503	\$ 264
Total liabilities	\$ 453,878	\$ 93,162	\$ 16,289	\$ 135,944	\$ 590,582	\$ (35,076)	\$ 1,254,779	\$ 600,619	\$ 384,816	\$ 269,344

(1) Taxable equivalent basis.

(2) Interest revenue is reported net of interest expense as we rely primarily on net interest income as a performance measure.

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

Note 29 Nature and extent of risks arising from financial instruments

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

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

Note 29 Nature and extent of risks arising from financial instruments (continued)

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

(Millions of Canadian dollars, except percentage amounts)	As at October 31, 2019								
	Canada	%	United States	%	Europe	%	Other International	%	Total
On-balance sheet assets other than derivatives (1)	\$ 646,567	69%	\$ 189,240	20%	\$ 60,554	6%	\$ 50,642	5%	\$ 947,003
Derivatives before master netting agreements (2), (3)	19,544	19%	23,250	23%	53,752	52%	6,421	6%	102,967
	\$ 666,111	64%	\$ 212,490	20%	\$ 114,306	11%	\$ 57,063	5%	\$ 1,049,970
Off-balance sheet credit instruments (4)									
Committed and uncommitted (5)	\$ 367,907	67%	\$ 148,326	27%	\$ 29,462	5%	\$ 5,774	1%	\$ 551,469
Other	67,410	58%	15,246	13%	31,934	28%	1,491	1%	116,081
	\$ 435,317	65%	\$ 163,572	25%	\$ 61,396	9%	\$ 7,265	1%	\$ 667,550

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

- (1) Includes assets purchased under reverse repurchase agreements and securities borrowed, loans and customers' liability under acceptances. The largest concentrations in Canada are Ontario at 56% (October 31, 2018 – 54%), the Prairies at 16% (October 31, 2018 – 18%), British Columbia and the territories at 14% (October 31, 2018 – 14%) and Quebec at 10% (October 31, 2018 – 10%). No industry accounts for more than 35% (October 31, 2018 – 32%) of total on-balance sheet credit instruments. The classification of our sectors aligns with our view of credit risk by industry. Sectors have been revised from those previously presented.
- (2) A further breakdown of our derivative exposures by risk rating and counterparty type is provided in Note 8.
- (3) Excludes valuation adjustments determined on a pooled basis.
- (4) Balances presented are contractual amounts representing our maximum exposure to credit risk.
- (5) Represents our maximum exposure to credit risk. Retail and wholesale commitments respectively comprise 43% and 57% of our total commitments (October 31, 2018 – 42% and 58%). The largest concentrations in the wholesale portfolio relate to Financial services at 13% (October 31, 2018 – 14%), Utilities at 11% (October 31, 2018 – 11%), Real estate & related at 9% (October 31, 2018 – 9%), Other services at 7% (October 31, 2018 – 8%), and Oil & gas at 7% (October 31, 2018 – 7%). The classification of our sectors aligns with our view of credit risk by industry. Sector percentages have been revised from those previously presented.

Note 30 Capital management

Regulatory capital and capital ratios

OSFI formally establishes risk-based capital and leverage targets for deposit-taking institutions in Canada. We are required to calculate our capital ratios using the Basel III framework. Under Basel III, regulatory capital includes Common Equity Tier 1 (CET1), Tier 1 and Tier 2 capital. CET1 capital mainly consists of common shares, retained earnings and other components of equity. Regulatory adjustments under Basel III include deductions of goodwill and other intangibles, certain deferred tax assets, defined benefit pension fund assets, investments in banking, financial and insurance entities, and the shortfall of provisions to expected losses. Tier 1 capital comprises predominantly CET1 and Additional Tier 1 items including non-cumulative preferred shares that meet certain criteria. Tier 2 capital includes subordinated debentures that meet certain criteria, certain loan loss allowances and non-controlling interests in subsidiaries Tier 2 instruments. Total capital is the sum of CET1, additional Tier 1 capital and Tier 2 capital.

Regulatory capital ratios are calculated by dividing CET1, Tier 1 and Total capital by risk-weighted assets. The leverage ratio is calculated by dividing Tier 1 capital by an exposure measure. The exposure measure consists of total assets (excluding items deducted from Tier 1 capital) and certain off-balance sheet items converted into credit exposure equivalents. Adjustments are also made to derivatives and secured financing transactions to reflect credit and other risks.

During 2019 and 2018, we complied with all Pillar 1 capital and leverage requirements, including the domestic stability buffer, imposed by OSFI.

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

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

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

Note 31 Offsetting financial assets and financial liabilities

Offsetting within our Consolidated Balance Sheets may be achieved where financial assets and liabilities are subject to master netting arrangements that provide the currently enforceable right of offset and where there is an intention to settle on a net basis, or realize the assets and settle the liabilities simultaneously. For derivative contracts and repurchase and reverse repurchase arrangements, this is generally achieved when there is a market mechanism for settlement (e.g., central counterparty exchange or clearing house) which provides daily net settlement of cash flows arising from these contracts. Margin receivables and margin payables are generally offset as they settle simultaneously through a market settlement mechanism.

Amounts that do not qualify for offsetting include master netting arrangements that only permit outstanding transactions with the same counterparty to be offset in an event of default or occurrence of other predetermined events. Such master netting arrangements include the International Swaps and Derivatives Association Master Agreement or certain derivative exchange or clearing counterparty agreements for derivative contracts, global master repurchase agreement and global master securities lending agreements for repurchase, reverse repurchase and other similar secured lending and borrowing arrangements.

The amount of financial collateral received or pledged subject to master netting arrangements or similar agreements but do not qualify for offsetting refers to the collateral received or pledged to cover the net exposure between counterparties by enabling the collateral to be realized in an event of default or the occurrence of other predetermined events. Certain amounts of collateral are restricted from being sold or re-pledged unless there is an event of default or the occurrence of other predetermined events.

The tables below provide the amount of financial instruments that have been offset on the Consolidated Balance Sheets and the amounts that do not qualify for offsetting but are subject to enforceable master netting arrangements or similar agreements. The amounts presented are not intended to represent our actual exposure to credit risk.

Financial assets subject to offsetting, enforceable master netting arrangements or similar agreements

	As at October 31, 2019							
	Amounts subject to offsetting and enforceable netting arrangements						Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet ⁽¹⁾	
	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
<i>(Millions of Canadian dollars)</i>								
Assets purchased under reverse repurchase agreements and securities borrowed	\$ 374,617	\$ 69,420	\$ 305,197	\$ 527	\$ 303,539	\$ 1,131	\$ 1,764	\$ 306,961
Derivative assets ⁽³⁾	88,996	710	88,286	62,524	15,458	10,304	13,274	101,560
Other financial assets	994	281	713	1	89	623	–	713
	\$ 464,607	\$ 70,411	\$ 394,196	\$ 63,052	\$ 319,086	\$ 12,058	\$ 15,038	\$ 409,234

Note 31 Offsetting financial assets and financial liabilities (continued)

(Millions of Canadian dollars)	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)			Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
	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			
Assets purchased under reverse repurchase agreements and securities borrowed	\$ 312,392	\$ 18,379	\$ 294,013	\$ 481	\$ 292,412	\$ 1,120	\$ 589	\$ 294,602	
Derivative assets (3)	81,770	583	81,187	57,010	14,720	9,457	12,852	94,039	
Other financial assets (4)	1,636	814	822	–	244	578	–	822	
	\$ 395,798	\$ 19,776	\$ 376,022	\$ 57,491	\$ 307,376	\$ 11,155	\$ 13,441	\$ 389,463	

(1) Financial collateral is reflected at fair value. The amount of financial instruments and financial collateral disclosed is limited to the net balance sheet exposure, and any over-collateralization is excluded from the table.

(2) Includes cash collateral of \$11.6 billion (October 31, 2018 – \$10.7 billion) and non-cash collateral of \$307.5 billion (October 31, 2018 – \$296.7 billion).

(3) Includes cash margin of \$3.6 billion (October 31, 2018 – \$2.2 billion) which offset against the derivative balance on the balance sheet.

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

Financial liabilities subject to offsetting, enforceable master netting arrangements or similar agreements

(Millions of Canadian dollars)	As at October 31, 2019								
	Amounts subject to offsetting and enforceable netting arrangements				Amounts subject to master netting arrangements or similar agreements but do not qualify for offsetting on the balance sheet (1)			Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
	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			
Obligations related to assets sold under repurchase agreements and securities loaned	\$ 294,758	\$ 69,420	\$ 225,338	\$ 527	\$ 224,506	\$ 305	\$ 1,248	\$ 226,586	
Derivative liabilities (3)	84,624	710	83,914	62,524	13,540	7,850	14,629	98,543	
Other financial liabilities	492	281	211	1	–	210	–	211	
	\$ 379,874	\$ 70,411	\$ 309,463	\$ 63,052	\$ 238,046	\$ 8,365	\$ 15,877	\$ 325,340	

(Millions of Canadian dollars)	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)			Amounts not subject to enforceable netting arrangements	Total amount recognized on the balance sheet
	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			
Obligations related to assets sold under repurchase agreements and securities loaned	\$ 225,193	\$ 18,379	\$ 206,814	\$ 481	\$ 206,106	\$ 227	\$ –	\$ 206,814	
Derivative liabilities (3)	76,877	583	76,294	57,010	11,446	7,838	13,944	90,238	
Other financial liabilities (4)	991	814	177	–	–	177	–	177	
	\$ 303,061	\$ 19,776	\$ 283,285	\$ 57,491	\$ 217,552	\$ 8,242	\$ 13,944	\$ 297,229	

(1) Financial collateral is reflected at fair value. The amount of financial instruments and financial collateral disclosed is limited to the net balance sheet exposure, and any over-collateralization is excluded from the table.

(2) Includes cash collateral of \$11.5 billion (October 31, 2018 – \$11.1 billion) and non-cash collateral of \$226.5 billion (October 31, 2018 – \$206.5 billion).

(3) Includes cash margin of \$1.3 billion (October 31, 2018 – \$2.3 billion) which offset against the derivative balance on the balance sheet.

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

Note 32 Recovery and settlement of on-balance sheet assets and liabilities

The table below presents an analysis of assets and liabilities recorded on our Consolidated Balance Sheets by amounts to be recovered or settled within one year and after one year, as at the balance sheet date, based on contractual maturities and certain other assumptions outlined in the footnotes below. As warranted, we manage the liquidity risk of various products based on historical behavioural patterns that are often not aligned with contractual maturities. Amounts to be recovered or settled within one year, as presented below, may not be reflective of our long-term view of the liquidity profile of certain balance sheet categories.

(Millions of Canadian dollars)	As at					
	October 31, 2019			October 31, 2018		
	Within one year	After one year	Total	Within one year	After one year	Total
Assets						
Cash and due from banks (1)	\$ 24,822	\$ 1,488	\$ 26,310	\$ 28,583	\$ 1,626	\$ 30,209
Interest-bearing deposits with banks	38,345	–	38,345	36,471	–	36,471
Securities						
Trading (2)	137,772	8,762	146,534	121,152	7,106	128,258
Investment, net of applicable allowance	17,283	85,187	102,470	16,795	77,813	94,608
Assets purchased under reverse repurchase agreements and securities borrowed	306,828	133	306,961	294,049	553	294,602
Loans						
Retail	108,382	317,704	426,086	97,414	302,038	399,452
Wholesale	48,737	147,133	195,870	43,280	136,998	180,278
Allowance for loan losses	–	–	(3,100)	–	–	(2,912)
Segregated fund net assets	–	1,663	1,663	–	1,368	1,368
Other						
Customers' liability under acceptances	18,062	–	18,062	15,635	6	15,641
Derivatives (2)	99,792	1,768	101,560	91,833	2,206	94,039
Premises and equipment	–	3,191	3,191	–	2,832	2,832
Goodwill	–	11,236	11,236	–	11,137	11,137
Other intangibles	–	4,674	4,674	–	4,687	4,687
Other assets	38,775	10,298	49,073	33,578	10,486	44,064
	\$ 838,798	\$ 593,237	\$ 1,428,935	\$ 778,790	\$ 558,856	\$ 1,334,734
Liabilities						
Deposits (3), (4)	\$ 719,933	\$ 166,072	\$ 886,005	\$ 669,682	\$ 166,515	\$ 836,197
Segregated fund net liabilities	–	1,663	1,663	–	1,368	1,368
Other						
Acceptances	18,091	–	18,091	15,657	5	15,662
Obligations related to securities sold short	32,668	2,401	35,069	29,725	2,522	32,247
Obligations related to assets sold under repurchase agreements and securities loaned	226,582	4	226,586	206,813	1	206,814
Derivatives (2)	97,415	1,128	98,543	88,112	2,126	90,238
Insurance claims and policy benefit liabilities	1,726	9,675	11,401	1,691	8,309	10,000
Other liabilities (4)	41,612	16,525	58,137	36,906	16,216	53,122
Subordinated debentures	1,999	7,816	9,815	103	9,028	9,131
	\$1,140,026	\$ 205,284	\$ 1,345,310	\$ 1,048,689	\$ 206,090	\$ 1,254,779

(1) Cash and due from banks are assumed to be recovered within one year, except for cash balances not available for use by the Bank.

(2) Trading securities classified as FVTPL and trading derivatives are presented as within one year as this best represents in most instances the short-term nature of our trading activities. Non-trading derivatives are presented according to the recovery or settlement of the hedging transaction.

(3) Demand deposits of \$405 billion (October 31, 2018 – \$382 billion) are presented as within one year due to their being repayable on demand or at short notice on a contractual basis. In practice, these deposits relate to a broad range of individuals and customer-types which form a stable base for our operations and liquidity needs.

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

The following table presents information regarding the legal entity of Royal Bank of Canada with its subsidiaries presented on an equity accounted basis.

Condensed Balance Sheets

(Millions of Canadian dollars)	As at	
	October 31 2019	October 31 2018
Assets		
Cash and due from banks	\$ 14,264	\$ 16,398
Interest-bearing deposits with banks	22,279	20,261
Securities	118,716	111,072
Investments in bank subsidiaries and associated corporations (1)	37,234	34,547
Investments in other subsidiaries and associated corporations	73,785	69,063
Assets purchased under reverse repurchase agreements and securities borrowed	123,755	107,941
Loans, net of allowance for loan losses	526,078	494,922
Net balances due from bank subsidiaries (1)	–	4,329
Other assets	152,422	137,821
	\$ 1,068,533	\$ 996,354
Liabilities and shareholders' equity		
Deposits (2)	\$ 681,509	\$ 642,271
Net balances due to bank subsidiaries (1)	2,678	–
Net balances due to other subsidiaries	36,594	38,985
Other liabilities (2)	254,678	226,475
	975,459	907,731
Subordinated debentures	9,551	8,762
Shareholders' equity	83,523	79,861
	\$ 1,068,533	\$ 996,354

(1) Bank refers primarily to regulated deposit-taking institutions and securities firms.

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

Condensed Statements of Income and Comprehensive Income

(Millions of Canadian dollars)	For the year ended	
	October 31 2019	October 31 2018
Interest income (1)	\$ 27,630	\$ 22,578
Interest expense (2)	14,966	10,662
Net interest income	12,664	11,916
Non-interest income (2), (3)	5,569	6,119
Total revenue	18,233	18,035
Provision for credit losses	1,730	1,294
Non-interest expense	9,212	9,085
Income before income taxes	7,291	7,656
Income taxes	1,568	1,546
Net income before equity in undistributed income of subsidiaries	5,723	6,110
Equity in undistributed income of subsidiaries	7,137	6,321
Net income	\$ 12,860	\$ 12,431
Other comprehensive income (loss), net of taxes	(1,441)	1,532
Total comprehensive income	\$ 11,419	\$ 13,963

(1) Includes dividend income from investments in subsidiaries and associated corporations of \$27 million (October 31, 2018 – \$12 million).

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

(3) Includes a nominal share of profit (losses) from associated corporations (October 31, 2018 – \$(31) million).

Condensed Statements of Cash Flows

	For the year ended	
	October 31 2019	October 31 2018
<i>(Millions of Canadian dollars)</i>		
Cash flows from operating activities		
Net income	\$ 12,860	\$ 12,431
Adjustments to determine net cash from operating activities:		
Change in undistributed earnings of subsidiaries	(7,137)	(6,321)
Change in deposits, net of securitizations ⁽¹⁾	39,238	38,331
Change in loans, net of securitizations	(31,744)	(26,281)
Change in trading securities	2,350	3,730
Change in obligations related to assets sold under repurchase agreements and securities loaned	12,449	49,811
Change in assets purchased under reverse repurchase agreements and securities borrowed	(15,814)	(58,326)
Change in obligations related to securities sold short	797	2,600
Other operating activities, net ⁽¹⁾	(8,149)	763
Net cash from (used in) operating activities	4,850	16,738
Cash flows from investing activities		
Change in interest-bearing deposits with banks	(2,018)	603
Proceeds from sales and maturities of investment securities	37,963	30,355
Purchases of investment securities	(39,461)	(32,561)
Net acquisitions of premises and equipment and other intangibles	(1,266)	(1,173)
Change in cash invested in subsidiaries	332	93
Change in net funding provided to subsidiaries	4,616	(3,363)
Net cash from (used in) investing activities	166	(6,046)
Cash flows from financing activities		
Issue of subordinated debentures	1,500	–
Repayment of subordinated debentures	(1,100)	–
Issue of common shares, net of issuance costs	105	72
Common shares purchased for cancellation	(1,030)	(1,522)
Issue of preferred shares, net of issuance costs	350	–
Redemption of preferred shares	(950)	(105)
Dividends paid	(6,025)	(5,640)
Net cash from (used in) financing activities	(7,150)	(7,195)
Net change in cash and due from banks	(2,134)	3,497
Cash and due from banks at beginning of year	16,398	12,901
Cash and due from banks at end of year	\$ 14,264	\$ 16,398
Supplemental disclosure of cash flow information		
Amount of interest paid ⁽¹⁾	\$ 14,574	\$ 9,475
Amount of interest received	25,883	20,490
Amount of dividends received	1,694	1,414
Amount of income taxes paid	1,789	3,562

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

Condensed Balance Sheets

(Millions of Canadian dollars) (1)	IFRS										CGAAP	
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010	
Assets												
Cash and due from banks	\$ 26,310	\$ 30,209	\$ 28,407	\$ 14,929	\$ 12,452	\$ 17,421	\$ 15,550	\$ 12,428	\$ 12,428	\$ 13,247	\$ 8,440	
Interest-bearing deposits with banks	38,345	36,471	32,662	27,851	22,690	8,399	9,039	10,246	6,460	12,181	13,254	
Securities, net of applicable allowance (2)	249,004	222,866	218,379	236,093	215,508	199,148	182,710	161,602	167,022	179,558	183,519	
Assets purchased under reverse repurchase agreements and securities borrowed	306,961	294,602	220,977	186,302	174,723	135,580	117,517	112,257	84,947	84,947	72,698	
Loans net of allowance	618,856	576,818	542,617	521,604	472,223	435,229	408,850	378,241	347,530	296,284	273,006	
Other	189,459	173,768	169,811	193,479	176,612	144,773	126,079	149,180	175,446	165,485	175,289	
Total Assets	\$1,428,935	\$1,334,734	\$1,212,853	\$1,180,258	\$1,074,208	\$ 940,550	\$ 859,745	\$ 823,954	\$ 793,833	\$ 751,702	\$ 726,206	
Liabilities												
Deposits (3)	\$ 886,005	\$ 836,197	\$ 789,036	\$ 757,589	\$ 697,227	\$ 614,100	\$ 563,079	\$ 512,244	\$ 479,102	\$ 444,181	\$ 414,561	
Other (3)	449,490	409,451	340,124	341,295	305,675	264,088	239,763	259,174	263,625	256,124	263,030	
Subordinated debentures	9,815	9,131	9,265	9,762	7,362	7,859	7,443	7,615	8,749	7,749	6,681	
Trust capital securities	–	–	–	–	–	–	–	–	894	–	727	
Non-controlling interest in subsidiaries	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,941	2,256	
Total Liabilities	\$1,345,310	\$1,254,779	\$1,138,425	\$1,108,646	\$1,010,264	\$ 886,047	\$ 810,285	\$ 779,033	\$ 752,370	\$ 709,995	\$ 687,255	
Equity attributable to shareholders	83,523	79,861	73,829	71,017	62,146	52,690	47,665	43,160	39,702	41,707	38,951	
Non-controlling interest	102	94	599	595	1,798	1,813	1,795	1,761	1,761	n.a.	n.a.	
Total equity	83,625	79,955	74,428	71,612	63,944	54,503	49,460	44,921	41,463	41,707	38,951	
Total liabilities and equity	\$1,428,935	\$1,334,734	\$1,212,853	\$1,180,258	\$1,074,208	\$ 940,550	\$ 859,745	\$ 823,954	\$ 793,833	\$ 751,702	\$ 726,206	

Condensed Income Statements

(Millions of Canadian dollars) (1)	IFRS										CGAAP	
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010	
Net interest income (3)	\$ 19,749	\$ 17,952	\$ 16,926	\$ 16,531	\$ 14,771	\$ 14,116	\$ 13,249	\$ 12,439	11,357	\$ 10,600	\$ 10,338	
Non-interest income (3), (4)	26,253	24,624	23,743	22,264	20,932	19,992	17,433	16,708	16,281	16,830	15,744	
Total revenue (4)	46,002	42,576	40,669	38,795	35,703	34,108	30,682	29,147	27,638	27,430	26,082	
Provision for credit losses (5)	1,864	1,307	1,150	1,546	1,097	1,164	1,237	1,299	1,133	975	1,240	
Insurance policyholder benefits, claims and acquisition expense	4,085	2,676	3,053	3,424	2,963	3,573	2,784	3,621	3,358	3,360	3,546	
Non-interest expense (4)	24,139	22,833	21,794	20,526	19,020	17,661	16,214	14,641	14,167	14,453	13,469	
Non-controlling interest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	104	99	
Net income from continuing operations	12,871	12,431	11,469	10,458	10,026	9,004	8,342	7,558	6,970	6,650	5,732	
Net loss from discontinued operations	–	–	–	–	–	–	–	(51)	(526)	(1,798)	(509)	
Net income	\$ 12,871	\$ 12,431	\$ 11,469	\$ 10,458	\$ 10,026	\$ 9,004	\$ 8,342	\$ 7,507	\$ 6,444	\$ 4,852	\$ 5,223	

Other Statistics – reported

(Millions of Canadian dollars, except percentages and per share amounts) (1)	IFRS										CGAAP	
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2011	2010	
PROFITABILITY MEASURES (6)												
Earnings per shares –basic	\$ 8.78	\$ 8.39	\$ 7.59	\$ 6.80	\$ 6.75	\$ 6.03	\$ 5.53	\$ 4.96	\$ 4.25	\$ 3.21	\$ 3.49	
–diluted	\$ 8.75	\$ 8.36	\$ 7.56	\$ 6.78	\$ 6.73	\$ 6.00	\$ 5.49	\$ 4.91	\$ 4.19	\$ 3.19	\$ 3.46	
Return on common equity (7), (8)	16.8%	17.6%	17.0%	16.3%	18.6%	19.0%	19.7%	19.6%	18.7%	12.9%	14.9%	
Return on risk-weighted assets (9)	2.52%	2.55%	2.49%	2.34%	2.45%	2.52%	2.67%	2.70%	2.44%	1.87%	2.03%	
Efficiency ratio (4)	52.5%	53.6%	53.6%	52.9%	53.3%	51.8%	52.8%	50.2%	51.3%	52.7%	51.6%	
KEY RATIOS												
PCL on impaired loans as a % of average net loans and acceptances (10)	0.27%	0.20%	0.21%	0.28%	0.24%	0.27%	0.31%	0.35%	0.33%	0.34%	0.45%	
Net interest margin (average earning assets, net) (3), (7)	1.61%	1.64%	1.69%	1.70%	1.71%	1.86%	1.88%	1.97%	1.86%	1.84%	1.99%	
SHARE INFORMATION												
Common shares outstanding (000s) – end of period	1,430,096	1,438,794	1,452,535	1,484,235	1,443,955	1,443,125	1,441,722	1,445,846	1,438,522	1,438,522	1,423,203	
Dividends declared per common share	\$ 4.07	\$ 3.77	\$ 3.48	\$ 3.24	\$ 3.08	\$ 2.84	\$ 2.53	\$ 2.28	\$ 2.08	\$ 2.08	\$ 2.00	
Dividend yield (11)	4.1%	3.7%	3.8%	4.3%	4.1%	3.8%	4.0%	4.5%	3.9%	3.9%	3.6%	
Dividend payout ratio	46%	45%	46%	48%	46%	47%	46%	46%	45%	47%	52%	
Book value per share	\$ 54.41	\$ 51.12	\$ 46.41	\$ 43.32	\$ 39.51	\$ 33.69	\$ 29.87	\$ 26.52	\$ 24.25	\$ 25.65	\$ 23.99	
Common share price (RY on TSX) (12)	\$ 106.24	\$ 95.92	\$ 100.87	\$ 83.80	\$ 74.77	\$ 80.01	\$ 70.02	\$ 56.94	\$ 48.62	\$ 48.62	\$ 54.39	
Market capitalization (TSX) (12)	151,933	138,009	146,554	124,476	107,925	115,393	100,903	82,296	69,934	69,934	77,502	
Market price to book value	1.95	1.88	2.17	1.93	1.89	2.38	2.34	2.15	2.00	1.90	2.27	
CAPITAL MEASURES – CONSOLIDATED (13)												
Common Equity Tier 1 capital ratio	12.1%	11.5%	10.9%	10.8%	10.6%	9.9%	9.6%	n.a.	n.a.	n.a.	n.a.	
Tier 1 capital ratio	13.2%	12.8%	12.3%	12.3%	12.2%	11.4%	11.7%	13.1%	n.a.	13.3%	13.0%	
Total capital ratio	15.2%	14.6%	14.2%	14.4%	14.0%	13.4%	14.0%	15.1%	n.a.	15.3%	14.4%	
Leverage Ratio	4.3%	4.4%	4.4%	4.4%	4.3%	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	

- Effective November 1, 2018, we adopted IFRS 15 Revenue from Contracts with Customers. Results from periods prior to November 1, 2018 are reported in accordance with IAS 18 Revenue in this 2019 Annual Report. Effective November 1, 2017, we adopted IFRS 9 Financial Instruments (IFRS 9). Results from periods prior to November 1, 2017 are reported in accordance with IAS 39 Financial Instruments: Recognition and Measurement (IAS 39) in this 2019 Annual Report.
- 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.
- Commencing Q4 2019, the interest component and the accrued interest payable recorded on certain deposits carried at FVTPL previously presented in trading revenue and deposits, respectively are presented in net interest income and other liabilities respectively. As at November 1, 2016, comparative amounts have been reclassified to conform with this presentation.
- 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.
- 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).
- Ratios for 2010-2012 represent continuing operations.
- 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.
- 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.
- 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.
- 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.
- Defined as dividends per common share divided by the average of the high and low share price in the relevant period.
- Based on TSX closing market price at period-end.
- Effective 2013, we calculated the capital and leverage ratios using the Basel III framework unless otherwise stated. 2010-2012 capital and leverage ratios were calculated using the Basel II framework. Capital and leverage ratios for 2011 were determined under CGAAP and Basel II framework.

Glossary

Acceptances

A bill of exchange or negotiable instrument drawn by the borrower for payment at maturity and accepted by a bank. The acceptance constitutes a guarantee of payment by the bank and can be traded in the money market. The bank earns a “stamping fee” for providing this guarantee.

Allowance for credit losses (ACL)

The amount deemed adequate by management to absorb expected credit losses as at the balance sheet date. The allowance is established for all financial assets subject to impairment assessment, including certain loans, debt securities, customers' liability under acceptances, financial guarantees, and undrawn loan commitments. The allowance is changed by the amount of provision for credit losses recorded, which is charged to income, and decreased by the amount of write-offs net of recoveries in the period.

Asset-backed securities (ABS)

Securities created through the securitization of a pool of assets, for example auto loans or credit card loans.

Assets under administration (AUA)

Assets administered by us, which are beneficially owned by clients, as at October 31, unless otherwise noted. Services provided in respect of assets under administration are of an administrative nature, including safekeeping, collecting investment income, settling purchase and sale transactions, and record keeping.

Assets under management (AUM)

Assets managed by us, which are beneficially owned by clients, as at October 31, unless otherwise noted. Services provided in respect of assets under management include the selection of investments and the provision of investment advice. We have assets under management that are also administered by us and included in assets under administration.

Attributed capital

Attributed capital is based on the Basel III regulatory capital requirements and economic capital.

Auction rate securities (ARS)

Debt securities whose interest rates are regularly reset through an auction process.

Average earning assets

Average earning assets include interest-bearing deposits with other banks including certain components of cash and due from banks, securities, assets purchased under reverse repurchase agreements and securities borrowed, loans, and excludes segregated fund net assets and other assets. The averages are based on the daily balances for the period.

Basis point (bp)

One one-hundredth of a percentage point (.01%).

Collateral

Assets pledged as security for a loan or other obligation. Collateral can take many forms, such as cash, highly rated securities, property, inventory, equipment and receivables.

Collateralized debt obligation (CDO)

Securities with multiple tranches that are issued by structured entities and collateralized by debt obligations including bonds and loans. Each tranche offers a varying degree of risk and return so as to meet investor demand.

Commercial mortgage-backed securities (CMBS)

Securities created through the securitization of commercial mortgages.

Commitments to extend credit

Unutilized amount of credit facilities available to clients either in the form of loans, bankers' acceptances and other on-balance sheet financing, or through off-balance sheet products such as guarantees and letters of credit.

Common Equity Tier 1 (CET1) capital

A regulatory Basel III capital measure comprised mainly of common shareholders' equity less regulatory deductions and adjustments for goodwill and intangibles, defined benefit pension fund assets, shortfall in allowances and other specified items.

Common Equity Tier 1 capital ratio

A risk-based capital measure calculated as CET1 capital divided by risk-weighted assets.

Covered bonds

Full recourse on-balance sheet obligations issued by banks and credit institutions that are fully collateralized by assets over which investors enjoy a priority claim in the event of an issuer's insolvency.

Credit default swaps (CDS)

A derivative contract that provides the purchaser with a one-time payment should the referenced entity/entities default (or a similar triggering event occur).

Derivative

A contract between two parties, which requires little or no initial investment and where payments between the parties are dependent upon the movements in price of an underlying instrument, index or financial rate. Examples of derivatives include swaps, options, forward rate agreements and futures. The notional amount of the derivative is the contract amount used as a reference point to calculate the payments to be exchanged between the two parties, and the notional amount itself is generally not exchanged by the parties.

Dividend payout ratio

Common dividends as a percentage of net income available to common shareholders.

Earnings per share (EPS), basic

Calculated as net income available to common shareholders divided by the average number of shares outstanding.

Earnings per share (EPS), diluted

Calculated as net income available to common shareholders divided by the average number of shares outstanding adjusted for the dilutive effects of stock options and other convertible securities.

Expected credit losses

The difference between the contractual cash flows due to us in accordance with the relevant contractual terms and the cash flows that we expect to receive, discounted to the balance sheet date.

Fair value

Fair value of a financial instrument is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Funding Valuation Adjustment

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

Guarantees and standby letters of credit

These primarily represent irrevocable assurances that a bank will make payments in the event that its client cannot meet its financial obligations to third parties. Certain other guarantees, such as bid and performance bonds, represent non-financial undertakings.

Hedge

A risk management technique used to mitigate exposure from market, interest rate or foreign currency exchange risk arising from normal banking operations. The elimination or reduction of such exposure is accomplished by establishing offsetting positions. For example, assets denominated in foreign currencies can be offset with liabilities in the same currencies or through the use of foreign exchange hedging instruments such as futures, options or foreign exchange contracts.

Hedge funds

A type of investment fund, marketed to accredited high net worth investors, that is subject to limited regulation and restrictions on its investments compared to retail mutual funds, and that often utilize aggressive strategies such as selling short, leverage, program trading, swaps, arbitrage and derivatives.

High-quality liquid assets (HQLA)

Assets are considered to be HQLA if they can be easily and immediately converted into cash at little or no loss of value during a time of stress.

Homeline products

This is comprised of residential mortgages and secured personal loans whereby the borrower pledges real estate as collateral.

International Financial Reporting Standards (IFRS)

IFRS are principles-based standards, interpretations and the framework adopted by the International Accounting Standards Board.

Impaired loans

Loans are classified as impaired when there has been a deterioration of credit quality to the extent that management no longer has reasonable assurance of timely collection of the full amount of principal and interest in accordance with the contractual terms of the loan agreement. Credit card balances are not classified as impaired as they are directly written off after payments are 180 days past due.

Leverage Ratio

A Basel III regulatory measure, the ratio divides Tier 1 capital by the sum of total assets plus specified off-balance sheet items.

Liquidity Coverage Ratio (LCR)

The Liquidity Coverage Ratio is a Basel III metric that measures the sufficiency of HQLA available to meet net short-term financial obligations over a thirty day period in an acute stress scenario.

Loan-to-value (LTV) ratio

Calculated based on the total facility amount for the residential mortgage and homeline product divided by the value of the related residential property.

Master netting agreement

An agreement between us and a counterparty designed to reduce the credit risk of multiple derivative transactions through the creation of a legal right of offset of exposure in the event of a default.

Net interest income

The difference between what is earned on assets such as loans and securities and what is paid on liabilities such as deposits and subordinated debentures.

Net interest margin (on average earning assets)

Calculated as net interest income divided by average earning assets.

Normal course issuer bid (NCIB)

A program for the repurchase of our own shares for cancellation through a stock exchange that is subject to the various rules of the relevant stock exchange and securities commission.

Notional amount

The contract amount used as a reference point to calculate payments for derivatives.

Off-balance sheet financial instruments

A variety of arrangements offered to clients, which include credit derivatives, written put options, backstop liquidity facilities, stable value products, financial standby letters of credit, performance guarantees, credit enhancements, mortgage loans sold with recourse, commitments to extend credit, securities lending, documentary and commercial letters of credit, note issuances and revolving underwriting facilities, securities lending indemnifications and indemnifications.

Office of the Superintendent of Financial Institutions Canada (OSFI)

The primary regulator of federally chartered financial institutions and federally administered pension plans in Canada. OSFI's mission is to safeguard policyholders, depositors and pension plan members from undue loss.

Operating leverage

The difference between our revenue growth rate and non-interest expense growth rate.

Options

A contract or a provision of a contract that gives one party (the option holder) the right, but not the obligation, to perform a specified transaction with another party (the option issuer or option writer) according to specified terms.

Provision for credit losses (PCL)

The amount charged to income necessary to bring the allowance for credit losses to a level

determined appropriate by management. This includes provisions on performing and impaired financial assets.

Repurchase agreements

These involve the sale of securities for cash and the simultaneous repurchase of the securities for value at a later date. These transactions normally do not constitute economic sales and therefore are treated as collateralized financing transactions.

Return on common equity (ROE)

Net income available to common shareholders, expressed as a percentage of average common equity.

Reverse repurchase agreements

These involve the purchase of securities for cash and the simultaneous sale of the securities for value at a later date. These transactions normally do not constitute economic sales and therefore are treated as collateralized financing transactions.

Risk-weighted assets (RWA)

Assets adjusted by a regulatory risk-weight factor to reflect the riskiness of on and off-balance sheet exposures. Certain assets are not risk-weighted, but deducted from capital. The calculation is defined by guidelines issued by OSFI. For more details, refer to the Capital management section.

Securities lending

Transactions in which the owner of a security agrees to lend it under the terms of a prearranged contract to a borrower for a fee. The borrower must collateralize the security loan at all times. An intermediary such as a bank often acts as agent for the owner of the security. There are two types of securities lending arrangements: lending with and without credit or market risk indemnification. In securities lending without indemnification, the bank bears no risk of loss. For transactions in which the bank provides an indemnification, it bears the risk of loss if the borrower defaults and the value of the collateral declines concurrently.

Securities sold short

A transaction in which the seller sells securities and then borrows the securities in order to deliver them to the purchaser upon settlement. At a later date, the seller buys identical securities in the market to replace the borrowed securities.

Securitization

The process by which various financial assets are packaged into newly issued securities backed by these assets.

Structured entities

A structured entity is an entity in which voting or similar rights are not the dominant factor in deciding who controls the entity, such as when the activities that significantly affect the entity's returns are directed by means of contractual arrangements. Structured entities often have restricted activities, narrow and well defined objectives, insufficient equity to

finance their activities, and financing in the form of multiple contractually-linked instruments.

Standardized Approach

Risk weights prescribed by OSFI are used to calculate risk-weighted assets for the credit risk exposures. Credit assessments by OSFI-recognized external credit rating agencies of S&P, Moody's, Fitch and DBRS are used to risk-weight our Sovereign and Bank exposures based on the standards and guidelines issued by OSFI. For our Business and Retail exposures, we use the standard risk weights prescribed by OSFI.

Taxable equivalent basis (teb)

Income from certain specified tax advantaged sources (eligible Canadian taxable corporate dividends) is increased to a level that would make it comparable to income from taxable sources. There is an offsetting adjustment in the tax provision, thereby generating the same after-tax net income.

Tier 1 capital

Tier 1 capital comprises predominantly of CET1 capital, with additional Tier 1 items such as preferred shares, innovative instruments and non-controlling interests in subsidiaries Tier 1 instruments.

Tier 2 capital

Tier 2 capital consists mainly of subordinated debentures that meet certain criteria, certain loan loss allowances and non-controlling interests in subsidiaries' Tier 2 instruments.

Total capital and total capital ratio

Total capital is defined as the total of Tier 1 and Tier 2 capital. The total capital ratio is calculated by dividing total capital by risk-weighted assets.

Tranche

A security class created whereby the risks and returns associated with a pool of assets are packaged into several classes of securities offering different risk and return profiles from those of the underlying asset pool. Tranches are typically rated by ratings agencies, and reflect both the credit quality of underlying collateral as well as the level of protection based on the tranches' relative subordination.

Unattributed capital

Unattributed capital represents common equity in excess of common equity attributed to our business segments and is reported in the Corporate Support segment.

Value-at-Risk (VaR)

A generally accepted risk-measurement concept that uses statistical models based on historical information to estimate within a given level of confidence the maximum loss in market value we would experience in our trading portfolio from an adverse one-day movement in market rates and prices.

Principal subsidiaries

(Millions of Canadian dollars)

As at October 31, 2019

Principal subsidiaries (1)	Principal office address (2)	Carrying value of voting shares owned by the Bank (3)
Royal Bank Holding Inc.	Toronto, Ontario, Canada	\$ 65,288
RBC Insurance Holdings Inc.	Mississauga, Ontario, Canada	
RBC Life Insurance Company	Mississauga, Ontario, Canada	
R.B.C. Holdings (Bahamas) Limited	Nassau, New Providence, Bahamas	
RBC Caribbean Investments Limited	George Town, Grand Cayman, Cayman Islands	
Royal Bank of Canada Insurance Company Ltd.	St. Michael, Barbados	
Investment Holdings (Cayman) Limited	George Town, Grand Cayman, Cayman Islands	
RBC (Barbados) Funding Ltd.	St. Michael, Barbados	
Capital Funding Alberta Limited	Calgary, Alberta, Canada	
RBC Global Asset Management Inc.	Toronto, Ontario, Canada	
RBC Investor Services Trust	Toronto, Ontario, Canada	
RBC Investor Services Bank S.A.	Esch-sur-Alzette, Luxembourg	
RBC (Barbados) Trading Bank Corporation	St. James, Barbados	
RBC US Group Holdings LLC (2)	Toronto, Ontario, Canada	22,329
RBC USA Holdco Corporation (2)	New York, New York, U.S.	
RBC Capital Markets, LLC (2)	New York, New York, U.S.	
City National Bank	Los Angeles, California, U.S.	
RBC Dominion Securities Limited	Toronto, Ontario, Canada	10,068
RBC Dominion Securities Inc.	Toronto, Ontario, Canada	
RBC Finance S.à r.l./B.V. (2)	Amsterdam, Netherlands	2,907
RBC Holdings (Luxembourg) S.A R.L.	Luxembourg, Luxembourg	
RBC Holdings (Channel Islands) Limited	Jersey, Channel Islands	
Royal Bank of Canada (Channel Islands) Limited	Guernsey, Channel Islands	
RBC Europe Limited	London, England	2,570
Royal Bank Mortgage Corporation	Toronto, Ontario, Canada	1,321
The Royal Trust Company	Montreal, Quebec, Canada	858
Royal Trust Corporation of Canada	Toronto, Ontario, Canada	298

(1) The Bank directly or indirectly controls each subsidiary.

(2) Each subsidiary is incorporated or organized under the law of the state or country in which the principal office is situated, except for RBC US Group Holdings LLC and RBC USA Holdco Corporation which are incorporated under the laws of the State of Delaware, U.S., RBC Capital Markets, LLC, which is organized under the laws of the State of Minnesota, U.S., and RBC Finance S.à r.l. / B.V. which is a company incorporated in the Netherlands with its official seat in Amsterdam, the Netherlands, and place of effective management, central administration, and principal establishment in Luxembourg, Grand Duchy of Luxembourg.

(3) The carrying value of voting shares is stated as the Bank's equity in such investments.

Shareholder Information

Corporate headquarters

Street address:
Royal Bank of Canada
200 Bay Street
Toronto, Ontario M5J 2J5
Canada
Tel: 1-888-212-5533

Mailing address:
P.O. Box 1
Royal Bank Plaza
Toronto, Ontario M5J 2J5
Canada
website: rbc.com

Transfer Agent and Registrar

Main Agent:
Computershare Trust
Company of Canada
1500 Robert-Bourassa Blvd.
Suite 700
Montreal, Quebec H3A 3S8
Canada
Tel: 1-866-586-7635 (Canada and
the U.S.) or 514-982-7555
(International)
Fax: 514-982-7580
website: computershare.com/rbc

Co-Transfer Agent (U.S.):
Computershare Trust
Company, N.A.
250 Royall Street
Canton, Massachusetts 02021
U.S.A.

Co-Transfer Agent (U.K.):
Computershare Investor
Services PLC
Securities Services – Registrars
P.O. Box 82, The Pavilions,
Bridgewater Road,
Bristol BS99 6ZZ
U.K.

Stock exchange listings

(Symbol: RY)

Common shares are listed on:
Canada – Toronto Stock
Exchange (TSX)
U.S. – New York Stock Exchange
(NYSE)
Switzerland – Swiss Exchange
(SIX)

All preferred shares are listed
on the TSX with the exception of
the series C-2. The related
depository shares of the series
C-2 preferred shares are listed
on the NYSE.

Valuation day price

For Canadian income tax
purposes, Royal Bank of
Canada's common stock was
quoted at \$29.52 per share on
the Valuation Day (December 22,
1971). This is equivalent to \$7.38
per share after adjusting for the
two-for-one stock split of March
1981 and the two-for-one stock
split of February 1990. The
one-for-one stock dividends in
October 2000 and April 2006 did
not affect the Valuation Day
amount for our common shares.

Shareholder contacts

For dividend information,
change in share registration or
address, lost stock certificates,
tax forms, estate transfers or
dividend reinvestment, please
contact:
Computershare Trust Company
of Canada
100 University Avenue, 8th Floor
Toronto, Ontario M5J 2Y1
Canada

Tel: 1-866-586-7635 (Canada and
the U.S.) or 514-982-7555
(International)
Fax: 1-888-453-0330 (Canada and
the U.S.) or 416-263-9394
(International)
email: service@computershare.com

For other shareholder inquiries,
please contact:
Shareholder Relations
Royal Bank of Canada
200 Bay Street
South Tower
Toronto, Ontario M5J 2J5
Canada
Tel: 416-955-7806

Financial analysts, portfolio managers, institutional investors

For financial information
inquiries, please contact:
Investor Relations
Royal Bank of Canada
200 Bay Street
South Tower
Toronto, Ontario M5J 2J5
Canada
Tel: 416-955-7802
or visit our website at
rbc.com/investorrelations

Direct deposit service

Shareholders in Canada and the
U.S. may have their RBC
common share dividends
deposited directly to their bank
account by electronic funds
transfer. To arrange for this
service, please contact our
Transfer Agent and Registrar,
Computershare Trust Company
of Canada.

Eligible dividend designation

For purposes of the Income Tax
Act (Canada) and any
corresponding provincial and
territorial tax legislation, all
dividends (and deemed
dividends) paid by RBC to
Canadian residents on both its
common and preferred shares,
are designated as “eligible
dividends”, unless stated
otherwise.

Common share repurchases

We are engaged in a Normal
Course Issuer Bid (NCIB) which
allows us to repurchase for
cancellation, up to 20 million
common shares during the
period spanning from March 1,
2019 to February 29, 2020, when
the bid expires, or such earlier
date as we may complete the
purchases pursuant to our
Notice of Intention filed with the
Toronto Stock Exchange.

We determine the amount and
timing of the purchases under
the NCIB, subject to prior
consultation with the Office of
the Superintendent of Financial
Institutions Canada.

A copy of our Notice of Intention
to file a NCIB may be obtained,
without charge, by contacting
our Corporate Secretary at our
Toronto mailing address.

2020 Quarterly earnings release dates

First quarter	February 21
Second quarter	May 27
Third quarter	August 26
Fourth quarter	December 2

2020 Annual Meeting

The Annual Meeting of Common
Shareholders will be held on
Wednesday, April 8, 2020, at 9:30
a.m. (Eastern Time) at the Metro
Toronto Convention Centre,
255 Front Street West, Toronto,
Ontario, Canada

Dividend dates for 2020

Subject to approval by the Board of Directors

	Record dates	Payment dates
Common and preferred shares series W, AA, AC, AE, AF, AG, AZ, BB, BD, BF, BH, BI, BJ, BK, BM and BO	January 27 April 23 July 27 October 26	February 24 May 22 August 24 November 24
Preferred shares series C-2 (US\$)	January 28 April 27 July 28 October 27	February 7 May 7 August 7 November 6

Governance

Summaries of the significant ways in which corporate governance
practices followed by RBC differ from corporate governance
practices required to be followed by U.S. domestic companies
under the NYSE listing standards are available on our website at
rbc.com/governance.

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

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