



Manulife Financial Corporation
Management's Discussion & Analysis

For the year ended December 31, 2019

Caution regarding forward-looking statements

From time to time, Manulife Financial Corporation (“MFC”) makes written and/or oral forward-looking statements, including in this document. In addition, our representatives may make forward-looking statements orally to analysts, investors, the media and others. All such statements are made pursuant to the “safe harbour” provisions of Canadian provincial securities laws and the U.S. Private Securities Litigation Reform Act of 1995.

The forward-looking statements in this document include, but are not limited to, statements with respect to the Company’s strategic priorities and 2022 targets for net promoter score, employee engagement, its highest potential businesses, expense efficiency and portfolio optimization, and also relate to, among other things, our objectives, goals, strategies, intentions, plans, beliefs, expectations and estimates, and can generally be identified by the use of words such as “may”, “will”, “could”, “should”, “would”, “likely”, “suspect”, “outlook”, “expect”, “intend”, “estimate”, “anticipate”, “believe”, “plan”, “forecast”, “objective”, “seek”, “aim”, “continue”, “goal”, “restore”, “embark” and “endeavour” (or the negative thereof) and words and expressions of similar import, and include statements concerning possible or assumed future results. Although we believe that the expectations reflected in such forward-looking statements are reasonable, such statements involve risks and uncertainties, and undue reliance should not be placed on such statements and they should not be interpreted as confirming market or analysts’ expectations in any way.

Certain material factors or assumptions are applied in making forward-looking statements and actual results may differ materially from those expressed or implied in such statements. Important factors that could cause actual results to differ materially from expectations include but are not limited to: general business and economic conditions (including but not limited to the performance, volatility and correlation of equity markets, interest rates, credit and swap spreads, currency rates, investment losses and defaults, market liquidity and creditworthiness of guarantors, reinsurers and counterparties); changes in laws and regulations; changes in accounting standards applicable in any of the territories in which we operate; changes in regulatory capital requirements; our ability to execute strategic plans and changes to strategic plans; downgrades in our financial strength or credit ratings; our ability to maintain our reputation; impairments of goodwill or intangible assets or the establishment of provisions against future tax assets; the accuracy of estimates relating to morbidity, mortality and policyholder behaviour; the accuracy of other estimates used in applying accounting policies, actuarial methods and embedded value methods; our ability to implement effective hedging strategies and unforeseen consequences arising from such strategies; our ability to source appropriate assets to back our long-dated liabilities; level of competition and consolidation; our ability to market and distribute products through current and future distribution channels; unforeseen liabilities or asset impairments arising from acquisitions and dispositions of businesses; the realization of losses arising from the sale of investments classified as available-for-sale; our liquidity, including the availability of financing to satisfy existing financial liabilities on expected maturity dates when required; obligations to pledge additional collateral; the availability of letters of credit to provide capital management flexibility; accuracy of information received from counterparties and the ability of counterparties to meet their obligations; the availability, affordability and adequacy of reinsurance; legal and regulatory proceedings, including tax audits, tax litigation or similar proceedings; our ability to adapt products and services to the changing market; our ability to attract and retain key executives, employees and agents; the appropriate use and interpretation of complex models or deficiencies in models used; political, legal, operational and other risks associated with our non-North American operations; acquisitions and our ability to complete acquisitions including the availability of equity and debt financing for this purpose; the disruption of or changes to key elements of the Company’s or public infrastructure systems; environmental concerns; our ability to protect our intellectual property and exposure to claims of infringement; and our inability to withdraw cash from subsidiaries.

Additional information about material risk factors that could cause actual results to differ materially from expectations and about material factors or assumptions applied in making forward-looking statements may be found in this document under “Risk Management”, “Risk Factors” and “Critical Actuarial and Accounting Policies” and in the “Risk Management” note to the Consolidated Financial Statements as well as elsewhere in our filings with Canadian and U.S. securities regulators. The forward-looking statements in this document are, unless otherwise indicated, stated as of the date hereof and are presented for the purpose of assisting investors and others in understanding our financial position and results of operations, our future operations, as well as our objectives and strategic priorities, and may not be appropriate for other purposes. We do not undertake to update any forward-looking statements, except as required by law.

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Management's Discussion and Analysis

This Management's Discussion and Analysis ("MD&A") is current as of February 12, 2020.

1. Manulife Financial Corporation

Manulife Financial Corporation is a leading international financial services group that helps people make their decisions easier and lives better. With our global headquarters in Toronto, Canada, we operate as Manulife across our offices in Canada, Asia, and Europe, and primarily as John Hancock in the United States. We provide financial advice, insurance, and wealth and asset management solutions for individuals, groups and institutions. At the end of 2019, we had more than 35,000 employees, over 98,000 agents, and thousands of distribution partners, serving almost 30 million customers. At the end of 2019, we had \$1.2 trillion (US\$0.9 trillion) in assets under management and administration, and during 2019, we made \$29.7 billion in payments to our customers. Our principal operations are in Asia, Canada and the United States where we have served customers for more than 100 years. We trade as 'MFC' on the Toronto, New York, and the Philippine stock exchanges, and under '945' in Hong Kong.

Our reporting segments are:

- Asia – providing insurance products and insurance-based wealth accumulation products in Asia.
- Canada – providing insurance products, insurance-based wealth accumulation products, and banking services in Canada.
- U.S. – providing life insurance products, insurance-based wealth accumulation products and has an in-force long-term care insurance business and an in-force annuity business.
- Global Wealth and Asset Management ("Global WAM") – providing fee-based wealth solutions to our retail, retirement and institutional customers around the world.
- Corporate and Other – comprised of investment performance on assets backing capital, net of amounts allocated to operating segments; financing costs; costs incurred by the corporate office related to shareholder activities (not allocated to operating segments); our Property and Casualty ("P&C") Reinsurance business; and run-off reinsurance business lines.

In this document, the terms "Company", "Manulife", "we" and "our" mean Manulife Financial Corporation ("MFC") and its subsidiaries. The term "MLI" means The Manufacturers Life Insurance Company and its subsidiaries.

a. Profitability

Profitability

As at and for the years ended December 31,
(\$ millions, unless otherwise stated)

	2019	2018	2017
Net income attributed to shareholders	\$ 5,602	\$ 4,800	\$ 2,104
Core earnings ⁽¹⁾	\$ 6,004	\$ 5,610	\$ 4,565
Diluted earnings per common share (\$)	\$ 2.77	\$ 2.33	\$ 0.98
Diluted core earnings per common share (\$) ⁽¹⁾	\$ 2.97	\$ 2.74	\$ 2.22
Return on common shareholders' equity ("ROE")	12.2%	11.6%	5.0%
Core ROE ⁽¹⁾	13.1%	13.7%	11.3%
Expense efficiency ratio ⁽¹⁾	52.0%	52.0%	55.4%

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Our net income attributed to shareholders was \$5.6 billion in 2019 compared with \$4.8 billion in 2018. Net income attributed to shareholders is comprised of core earnings¹ (consisting of items we believe reflect the underlying earnings capacity of the business), which amounted to \$6.0 billion in 2019 compared with \$5.6 billion in 2018, and items excluded from core earnings of \$0.4 billion of net charges in 2019 compared with \$0.8 billion of net charges in 2018.

The \$0.8 billion increase in net income attributed to shareholders was due to growth in core earnings of \$0.4 billion, the non-recurrence of a 2018 restructuring charge, and higher investment-related experience gains. The direct impact of markets was a charge of \$0.8 billion in 2019 and a charge of \$0.9 billion in 2018 – the 2019 amount included a \$0.5 billion charge related to updated Ultimate Reinvestment Rate ("URR") assumptions issued by the Canadian Actuarial Standards Board (the "ASB").

The \$0.4 billion increase in core earnings was driven by in-force growth in Asia and Global WAM, higher new business, and higher investment income and the non-recurrence of 2018 market losses on seed money investments in our surplus portfolio. These items were partially offset by the impact on earnings of actions taken over the last 12 months to improve the capital efficiency of our legacy businesses, unfavourable policyholder experience and the impact of lower new business volumes in Japan. Core earnings in 2019 included a net policyholder experience charge of \$17 million post-tax (\$55 million pre-tax) compared with gains of \$38 million post-tax (\$64 million pre-tax) in 2018^{2,3}. Reinsurance and alternative long-durations assets ("ALDA") portfolio mix actions to improve the capital efficiency of our legacy businesses resulted in \$116 million lower core earnings in 2019 compared with 2018.

¹ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

² Policyholder experience includes gains of \$83 million from the release of margins on medical policies in Hong Kong that have lapsed for customers who have opted to change their existing policies to the new Voluntary Health Insurance Scheme ("VHIS") products. These gains did not have a material impact on core earnings as they were offset by new business strain.

³ Effective 2018, policyholder experience is being reported excluding minority interest. Comparative prior periods have been updated.

Core earnings by segment is presented in the following table. See Asia, Canada, U.S., and Global WAM sections below.

For the years ended December 31, (\$ millions)	% change ⁽¹⁾			
	2019	2018	2019 vs 2018	2017
Core earnings by segment^{(1),(2),(3)}				
Asia	\$ 2,005	\$ 1,766	11%	\$ 1,453
Canada	1,201	1,327	(9)%	1,209
U.S.	1,876	1,789	2%	1,609
Global Wealth and Asset Management	1,021	985	2%	816
Corporate and Other (excluding core investment gains)	(499)	(657)	24%	(922)
Core investment gains ^{(2),(4)}	400	400	–	400
Total core earnings	\$ 6,004	\$ 5,610	5%	\$ 4,565

(1) Percentage change is on a constant exchange rate basis. See “Performance and Non-GAAP Measures” below.

(2) This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

(3) 2018 comparatives for core earnings in each segment have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

(4) See note (2) in the table below.

The table below reconciles 2019, 2018 and 2017 net income attributed to shareholders to core earnings and provides further details for each of the items excluded from core earnings.

For the years ended December 31, (\$ millions)	2019	2018	2017
Core earnings⁽¹⁾	\$ 6,004	\$ 5,610	\$ 4,565
Items to reconcile core earnings to net income (loss) attributed to shareholders:			
Investment-related experience outside of core earnings ⁽²⁾	366	200	167
Direct impact of equity markets and interest rates and variable annuity guarantee liabilities	(778)	(857)	209
<i>Direct impact of equity markets and variable annuity guarantee liabilities⁽³⁾</i>	456	(928)	533
<i>Fixed income reinvestment rates assumed in the valuation of policy liabilities⁽⁴⁾</i>	(1,130)	354	(200)
<i>Sale of AFS bonds and derivative positions in the Corporate and Other segment</i>	396	(283)	(41)
<i>Changes to the ultimate reinvestment rate⁽⁵⁾</i>	(500)	–	–
<i>Risk reduction related items</i>	–	–	(83)
Change in actuarial methods and assumptions ⁽⁶⁾	(21)	(51)	(35)
Charge related to decision to change portfolio asset mix supporting our legacy businesses ⁽⁷⁾	–	–	(1,032)
Reinsurance transactions ⁽⁸⁾	81	175	146
Restructuring charge ⁽⁹⁾	–	(263)	–
Tax-related items and other ⁽¹⁰⁾	(50)	(14)	(1,916)
Total items excluded from core earnings	(402)	(810)	(2,461)
Net income attributed to shareholders	\$ 5,602	\$ 4,800	\$ 2,104

(1) This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

(2) In accordance with our definition of core earnings, we include up to \$400 million of net favourable investment-related experience reported in a single year, as core investment gains (see “Performance and Non-GAAP Measures” below). Items excluded from core earnings include net investment-related experience in excess of \$400 million per annum or net unfavourable investment-related experience on a year-to-date basis. In 2019, we generated investment-related experience gains of \$766 million, reflecting the favourable impact of fixed income reinvestment activities on the measurement of our policy liabilities, strong returns (including changes in fair value) on ALDA, and strong credit experience. In 2018, investment-related experience gains of \$600 million reflected the favourable impact of fixed income reinvestment activities on the measurement of our policy liabilities and strong credit experience, partially offset by lower than expected returns (including changes in fair value) on ALDA.

(3) In 2019, the net gains related to equity markets of \$456 million included a gain of \$443 million from gross equity exposure and a gain of \$45 million from dynamic hedging experience, partially offset by a charge of \$32 million from macro hedge experience. In 2018, the net charge of \$928 million included a charge of \$1,718 million from gross equity exposure, partially offset by a gain of \$767 million from dynamic hedging experience and a gain of \$23 million from macro hedge experience.

(4) In 2019, the net charge due to fixed income reinvestment rates of \$1,130 million was primarily due to the narrowing of corporate spreads, the impact of lower risk-free rates and a steepening of the yield curve. In 2018, the \$354 million net gain for fixed income reinvestment assumptions was driven primarily by the widening of corporate spreads partially offset by movement in risk-free rates and increases in swap spreads that resulted in a decrease in the fair value of our swaps.

(5) In 2019, the ASB issued new assumptions with reductions to the URR and updates to the calibration criteria for stochastic risk-free rates. The updated standard included a reduction of 15 basis points in the URR and a corresponding change to stochastic risk-free rate modeling and resulted in a \$500 million charge. The long-term URR for risk-free rates in Canada is prescribed at 3.05% and we use the same assumption for the U.S. Our assumption for Japan is 1.6%. The ASB does not anticipate an update to this promulgation prior to the effective date of IFRS 17, expected to be 2022 at the earliest.

(6) See “Critical Actuarial and Accounting Policies – Review of Actuarial Methods and Assumptions” section below for further information on the 2019 and 2018 charges.

(7) The 2017 charge reflected a \$1.0 billion post-tax charge related to our decision to reduce the allocation to ALDA in our portfolio asset mix supporting our North American legacy businesses.

(8) The 2019 net gain of \$81 million includes gains resulting from reinsurance transactions primarily related to our legacy businesses in Canada and the U.S. The 2018 net gain of \$175 million includes gains resulting from reinsurance transactions partly related to our legacy businesses in Canada and the U.S. as well.

(9) The 2018 charge of \$263 million primarily related to the voluntary exit program in our Canadian operation transformation program and to our North American voluntary early retirement program as well as costs to optimize our real estate footprint in the U.S. and Canada.

(10) Tax-related items and other charges in 2019 primarily related to a tax rate change in the province of Alberta, Canada. Charges in 2018 and 2017 primarily relate to U.S. tax reform.

Diluted earnings per common share was \$2.77 in 2019, compared with \$2.33 in 2018. Diluted core earnings per common share¹ was \$2.97 in 2019, compared with \$2.74 in 2018. The changes in these measures were related to the increase in both net income and core earnings, respectively. The diluted weighted average common shares outstanding was \$1,962 million in 2019 and \$1,988 million in 2018.

Return on common shareholders' equity ("ROE") for 2019 was 12.2%, compared with 11.6% for 2018 and core return on shareholders' equity ("core ROE")¹ was 13.1% in 2019 compared with 13.7% in 2018. The decrease in 2019 core ROE was predominantly driven by the impact of lower interest rates and increased returns from equity markets on our available-for-sale ("AFS") holdings, increasing common shareholders' equity.

Expense efficiency ratio was 52.0% for 2019, compared with 52.0% in 2018. General expenses included in core earnings ("core general expenses") and pre-tax core earnings both grew 3%.

b. Growth

Growth metrics

As at and for the years ended December 31,
(\$ millions, unless otherwise stated)

	2019	2018	2017
Asia APE sales	\$ 4,278	\$ 4,012	\$ 3,747
Canada APE sales	1,057	975	1,366
U.S. APE sales	702	553	603
Total APE sales ⁽¹⁾	6,037	5,540	5,716
Asia new business value	1,595	1,443	1,201
Canada new business value	237	207	191
U.S. new business value	218	98	51
Total new business value ⁽¹⁾	2,050	1,748	1,443
Wealth and asset management gross flows (\$ billions) ⁽¹⁾	114.2	119.0	122.0
Wealth and asset management net flows (\$ billions) ⁽¹⁾	(0.9)	1.6	18.3
Wealth and asset management assets under management and administration (\$ billions) ⁽¹⁾	681.4	608.8	609.0
Total assets under management and administration (\$ billions) ⁽¹⁾	1,188.9	1,083.5	1,071.3

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Annualized premium equivalent ("APE") sales¹ were \$6.0 billion in 2019, an increase of 7%² compared with 2018. In Asia, APE sales increased 4% as double-digit growth in Hong Kong and Asia Other³ was partially offset by lower sales in Japan due to a change in tax rules on the corporate-owned life insurance ("COLI") product. In Canada, APE sales increased 8% driven by higher Manulife Par and small and mid-case group insurance sales, partially offset by variability in the large-case group insurance market. In the U.S., APE sales increased 24% driven by domestic and international universal life sales.

New business value ("NBV")¹ was \$2.0 billion in 2019, an increase of 15% compared with 2018. In Asia, NBV increased 8% to \$1,595 million with growth in Hong Kong and Asia Other, partially offset by a decline in Japan sales. In Canada, NBV of \$237 million was up 14% from 2018, driven by higher individual insurance sales. In the U.S., NBV doubled to \$218 million, primarily as a result of recent actions to improve margins, as well as higher sales and a more favourable product mix.

WAM gross flows¹ of \$114.2 billion were \$4.8 billion or 6% lower than 2018 as lower retail and institutional asset management flows were only partially offset by higher retirement flows. See "Global Wealth and Asset Management" section below for further details.

WAM net outflows¹ were \$0.9 billion in 2019 compared with net inflows of \$1.6 billion in 2018. Net inflows in Asia were \$4.8 billion in 2019, compared with net inflows of \$5.7 billion in 2018, driven by lower gross flows and higher redemptions in institutional asset management, partially offset by lower retail redemptions. Net outflows in Canada were \$3.6 billion in 2019 compared with net inflows of \$2.0 billion in 2018 driven by the decision by one institutional client in the third quarter of 2019 to internalize the management of several large, primarily fixed income, mandates and the redemption of a large-case retirement plan in the second quarter of 2019, partially offset by strong retail net inflows. Net outflows in the U.S. were \$2.0 billion in 2019 compared with net outflows of \$6.1 billion in 2018, primarily due to lower retail redemptions amid improved equity market returns and the redemption of three large-case retirement plans in the second quarter of 2018.

Assets under Management and Administration ("AUMA")¹

AUMA as at December 31, 2019 was \$1.2 trillion, an increase of 13%, compared with December 31, 2018, primarily due to the favourable impact of markets. The Global Wealth and Asset Management portion of AUMA as at December 31, 2019 was \$681 billion, an increase of 16%, compared with December 31, 2018, driven by improved market returns which were partially offset by net outflows of \$0.9 billion.

¹ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

² Percentage growth / declines in core general expenses, APE sales, gross flows, NBV, assets under management and administration, core earnings, assets under management and core EBITDA are stated on a constant exchange rate basis. Constant exchange rate basis is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

³ Asia Other excludes Japan and Hong Kong.

Assets under Management and Administration

As at December 31,
(\$ millions)

	2019	2018	2017
General fund	\$ 378,527	\$ 353,664	\$ 334,222
Segregated funds net assets ⁽¹⁾	343,108	313,209	324,307
Mutual funds, institutional asset management and other ^{(1),(2)}	321,826	292,200	289,559
Total assets under management	1,043,461	959,073	948,088
Other assets under administration	145,397	124,449	123,188
Total assets under management and administration	\$ 1,188,858	\$ 1,083,522	\$ 1,071,276

⁽¹⁾ Segregated fund assets, mutual fund assets and other funds are not available to satisfy the liabilities of the Company's general fund.

⁽²⁾ Other funds represent pension funds, pooled funds, endowment funds and other institutional funds managed by the Company on behalf of others.

Revenue

Revenue includes (i) premiums received on life and health insurance policies and fixed annuity products, net of premiums ceded to reinsurers; (ii) investment income comprised of income earned on general fund assets, credit experience and realized gains and losses on assets held in the Corporate segment; (iii) fee and other income received for services provided; and (iv) realized and unrealized gains and losses on assets supporting insurance and investment contract liabilities and on our macro hedging program. Premium equivalents from administrative services only ("ASO"), as well as deposits received by the Company on investment contracts such as segregated funds, mutual funds and managed funds are not included in revenue; however, the Company does receive fee income from these products, which is included in revenue. Fees generated from deposits and ASO premium and deposit equivalents are an important part of our business and as a result, revenue does not fully represent sales and other activity taking place during the respective periods.

For 2019, revenue before realized and unrealized investment gains and losses was \$61.4 billion compared with \$48.0 billion in 2018. The increase was primarily due to the impact on ceded premiums in 2018 from U.S. legacy business transactions.

In 2019, the net realized and unrealized investment gains on assets supporting insurance and investment contract liabilities and on the macro hedging program were \$18.2 billion compared with losses of \$9.0 billion for full year 2018. The 2019 gain was primarily due to lower interest rates and higher equity markets. The losses in 2018 were driven by higher interest rates and a decline in equity markets.

See "Impact of Fair Value Accounting" below.

Revenue

For the years ended December 31,
(\$ millions)

	2019	2018	2017
Gross premiums	\$ 41,059	\$ 39,150	\$ 36,361
Premiums ceded to reinsurers	(5,481)	(15,138)	(8,151)
Net premium income	35,578	24,012	28,210
Investment income	15,393	13,560	13,649
Other revenue	10,399	10,428	10,746
Revenue before realized and unrealized investment gains and losses	61,370	48,000	52,605
Realized and unrealized investment gains and losses on assets supporting insurance and investment contract liabilities and on the macro hedge program	18,200	(9,028)	5,718
Total revenue	\$ 79,570	\$ 38,972	\$ 58,323

c. Financial Strength

Financial strength metrics

As at and for the years ended December 31,
(\$ millions, unless otherwise stated)

	2019	2018	2017
MLI's LICAT total ratio ⁽¹⁾	140%	143%	n/a
Financial leverage ratio	25.1%	28.6%	30.3%
Consolidated capital ⁽²⁾	\$ 57,369	\$ 56,010	\$ 50,659
Book value per common share (\$)	\$ 23.25	\$ 21.38	\$ 18.89
Book value per common share excluding accumulated other comprehensive income ("AOCI") (\$)	\$ 19.94	\$ 18.23	\$ 16.83

⁽¹⁾ The Life Insurance Capital Adequacy Test ("LICAT") framework replaced the Minimum Continuing Capital and Surplus Requirements ("MCCSR") framework on January 1, 2018.

⁽²⁾ This item is a Non-GAAP measure. See "Performance and Non-GAAP Measures" below.

The Life Insurance Capital Adequacy Test ("LICAT") total ratio for MLI was 140% as at December 31, 2019, compared with 143% as at December 31, 2018. The three percentage point decline from December 31, 2018 was primarily driven by the narrowing of corporate spreads and \$2.0 billion of capital redemptions¹, partially offset by the decrease in risk-free rates and actions to release capital in our North American legacy businesses.

¹ For LICAT, the \$2.0 billion of redemptions includes the \$0.5 billion redeemed in January 2020 (announced in December 2019) as the LICAT ratio reflects all the actual and announced capital redemptions.

MFC's financial leverage ratio decreased to 25.1% as at December 31, 2019 from 28.6% as at December 31, 2018, driven by net income attributed to shareholders net of dividends, the redemption of \$1.5 billion of securities, and the increase in values of AFS securities, partially offset by the net impact of share buybacks and issuance of shares for the dividend reinvestment program, and the impact of a stronger Canadian dollar compared with the U.S. dollar.

Consolidated capital¹ was \$57.4 billion as at December 31, 2019 compared with \$56.0 billion as at December 31, 2018, an increase of approximately \$1.4 billion. The increase was primarily driven by net income attributed to shareholders net of dividends of \$3.5 billion and a net increase in accumulated other comprehensive income ("AOCI") of \$0.2 billion, partially offset by capital redemptions of \$1.5 billion and the net impact of share buybacks and issuance of shares for the dividend reinvestment program of \$0.6 billion. The net increase in AOCI was due to the impact of lower interest rates and higher equity markets on assets classified as AFS, mostly offset by the impact of a stronger Canadian dollar compared to the U.S. dollar.

Book value per common share as at December 31, 2019 was \$23.25, an increase of 9% compared with \$21.38 as at December 31, 2018, and the book value per common share excluding AOCI was \$19.94 as at December 31, 2019, an increase of 9% compared with \$18.23 as at December 31, 2018. The increase in the book value per common share was primarily driven by net income attributed to shareholders net of dividends and a net increase in AOCI, partially offset by the net impact of share buybacks and issuance of shares for the dividend reinvestment program. The number of common shares outstanding was 1,949 million as at December 31, 2019 and 1,971 million as at December 31, 2018.

d. Impact of Fair Value Accounting

Fair value accounting policies affect the measurement of both our assets and our liabilities. The difference between the reported amounts of our assets and liabilities determined as of the balance sheet date and the immediately preceding balance sheet date in accordance with the applicable fair value accounting principles is reported as investment-related experience and the direct impact of equity markets and interest rates and variable annuity guarantees, each of which impacts net income.

We reported \$18.2 billion of net realized and unrealized investment gains in investment income in 2019 (2018 – losses of \$9.0 billion).

As outlined under "Critical Actuarial and Accounting Policies" below, net insurance contract liabilities under IFRS are determined using Canadian Asset Liability Method ("CALM"), as required by the Canadian Institute of Actuaries ("CIA"). The measurement of policy liabilities includes the estimated value of future policyholder benefits and settlement obligations to be paid over the term remaining on in-force policies, including the costs of servicing the policies, reduced by the future expected policy revenues and future expected investment income on assets supporting the policies. Investment returns are projected using the current asset portfolios and projected reinvestment strategies. Experience gains and losses are reported when current period activity differs from what was assumed in the policy liabilities at the beginning of the period. We classify gains and losses by assumption type. For example, current period investing activities that increase (decrease) the future expected investment income on assets supporting the policies will result in an investment-related experience gain (loss). See description of investment-related experience in "Performance and Non-GAAP Measures" below.

As noted in "Critical Actuarial and Accounting Policies – Future Accounting and Reporting Changes" below, IFRS 17 is expected to replace IFRS 4, and therefore CALM, in 2022 at the earliest (as per the IASB exposure draft published in June 2019, with potential for further deferral currently under consideration). The new standard will materially change insurance contract measurement and the timing of recognition of earnings. While there will be many changes, two items of note are:

- Under IFRS 17, the discount rate used to estimate the present value of insurance contract liabilities is based on the characteristics of the liability, whereas under CALM we use current and projected asset returns supporting insurance contract liabilities to value the liabilities (see "Critical Actuarial and Accounting Policies – Determination of Policy Liabilities – Investment Returns" below). The difference in the discount rate approach also impacts the timing of investment-related experience earnings emergence. Under CALM, investing activities impact reported investment-related experience (see "Performance and Non-GAAP measures" section below). Under IFRS 17, the impact of investing activities will emerge over the life of the asset.
- Under IFRS 17, new business gains are recorded on the balance sheet (in the contractual service margin component of the insurance contract liability) and are amortized into income as services are provided. Under CALM, new business gains (and losses) are recognized in income immediately. In 2019, we reported \$819 million (post-tax) of new business gains in net income attributed to shareholders (2018 – \$746 million).

e. Public Equity Risk and Interest Rate Risk

At December 31, 2019, the impact of a 10% decline in equity markets was estimated to be a charge of \$520 million and the impact of a 50 basis point decline in interest rates, across all durations and markets, on our earnings was estimated to be a charge of \$100 million. See "Risk Management" and "Risk Factors" below.

f. Impact of Foreign Exchange Rates

We have worldwide operations, including in Canada, the United States and various markets in Asia, and generate revenues and incur expenses in local currencies in these jurisdictions, all of which are translated into Canadian dollars. The bulk of our exposure to foreign exchange rates is to movements in the U.S. dollar.

¹ This item is a Non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Items impacting our Consolidated Statements of Income are translated to Canadian dollars using average exchange rates for the respective quarterly period. For items impacting our Consolidated Statements of Financial Position, period end rates are used for currency translation purpose. The following table provides the most relevant foreign exchange rates for 2019 and 2018.

Exchange rate	Quarterly					Full Year	
	4Q19	3Q19	2Q19	1Q19	4Q18	2019	2018
Average ⁽¹⁾							
U.S. dollar	1.3200	1.3204	1.3377	1.3295	1.3204	1.3269	1.2958
Japanese yen	0.0122	0.0123	0.0122	0.0121	0.0117	0.0122	0.0117
Hong Kong dollar	0.1687	0.1686	0.1706	0.1694	0.1687	0.1693	0.1654
Period end							
U.S. dollar	1.2988	1.3243	1.3087	1.3363	1.3642	1.2988	1.3642
Japanese yen	0.0120	0.0123	0.0121	0.0121	0.0124	0.0120	0.0124
Hong Kong dollar	0.1668	0.1689	0.1676	0.1702	0.1742	0.1668	0.1742






⁽¹⁾ Average rates for the quarter are from Bank of Canada which are applied against Consolidated Statements of Income items for each period. Average rate for the full year is a 4-point average of the quarterly average rates.

Net income attributed to shareholders and core earnings from the Company's foreign operations are translated to Canadian dollars, and in general, our net income attributed to shareholders and core earnings benefit from a weakening Canadian dollar and are adversely affected by a strengthening Canadian dollar. However, in a period of losses, the weakening of the Canadian dollar has the effect of increasing the losses. The relative impact of foreign exchange in any given period is driven by the movement of currency rates as well as the proportion of earnings generated in our foreign operations.

Changes in foreign exchange rates, primarily due to the strengthening of the U.S. dollar compared with the Canadian dollar, increased core earnings by approximately \$100 million in 2019 compared with 2018. The impact of foreign currency on items excluded from core earnings does not provide relevant information given the nature of these items.

g. Strategic priorities progress update

Manulife's mission – Decisions made easier. Lives made better – guided our business throughout 2019. Our focused efforts produced solid results on our five strategic priorities.

Strategic priorities	2022 Targets ¹	2019 Performance	Highlights on our progress
1. Portfolio Optimization 	<ul style="list-style-type: none"> Release a total of \$5 billion in capital from legacy businesses 	<ul style="list-style-type: none"> Medium-term target achieved 3 years ahead of schedule Delivered \$5.1 billion of cumulative capital benefits, including \$2.1 billion in 2019 	<ul style="list-style-type: none"> Achieved \$2.2 billion from a reduction in the allocation to ALDA in the portfolio asset mix supporting legacy business \$2.4 billion from reinsurance and other actions in our North American Legacy businesses \$0.5 billion related to real estate transactions to reduce lease renewal risk
2. Expense Efficiency 	<ul style="list-style-type: none"> Achieve a 50% expense efficiency ratio Deliver \$1 billion in expense efficiencies 	<ul style="list-style-type: none"> Expense efficiency ratio of 52% in 2019, compared to 52% in 2018 Cumulative expense efficiencies of \$700 million in pre-tax annual savings, including \$400 million in 2019 	<ul style="list-style-type: none"> Modest core general expense growth of 3%, less than half the historic average, reflecting the impact of our expense efficiency initiatives Executed voluntary exit and early retirement programs for eligible staff in North America Consolidated our real estate footprint Implemented automation, robotic solutions, and leveraged artificial intelligence to adjudicate less complex transactions Renegotiated various contracts with third-party vendors
3. Accelerate Growth 	<ul style="list-style-type: none"> Generate two-thirds of core earnings from highest potential businesses² 	<ul style="list-style-type: none"> 57% of our core earnings in 2019 were generated from highest potential businesses, compared to 55% in 2018 	<ul style="list-style-type: none"> Core earnings from highest potential businesses outpaced other businesses by almost 11% Entered into a long-term strategic partnership with HaoDF.com in mainland China and agreed to enter into a joint venture with Mahindra Finance in India. Expanded our behavioural insurance product base through the launch of ManulifeMOVE insurance program in Vietnam and Cambodia, and the John Hancock Aspire program in the U.S.
4. Digital, Customer Leader 	<ul style="list-style-type: none"> Improve Net Promoter Score by 30 points, as compared to a baseline of +1 in 2017 	<ul style="list-style-type: none"> rNPS score of +8, a +7 point improvement from the 2017 baseline and a -1 point decline from the +9 improvement in 2018 2019 scores remain competitive with global benchmarks 	<ul style="list-style-type: none"> Implemented relational net promoter score ("rNPS") systems in all markets Recognized as the best life insurance company for digital transformation in Vietnam Launched an end-to-end online insurance platform in collaboration with DBS Bank for the Singapore market Launched a voice-enabled retirement product using Alexa (industry first)
5. High Performing Team 	<ul style="list-style-type: none"> Achieve top quartile employee engagement compared to global financial services and insurance peers 	<ul style="list-style-type: none"> 8 point improvement compared to 2018 score 2019 employee engagement was close to the median of our designated peer group 	<ul style="list-style-type: none"> >90% participation in the employee engagement survey Crowd-sourced and implemented employee ideas to automate repetitive tasks Integrated our performance rewards to equally recognize work contributions and living our values Conducted leadership training focused on "winning teams" and "transformation ready leadership" Received Bloomberg Gender-Equality Index, Best Company to Work for in Asia, Canada's Best Diversity Employers

¹ See "Caution regarding forward-looking statements" above.

² Asia, Global WAM, group insurance in Canada, and behavioural insurance products

2. Asia

Our Asia segment is a leading provider of insurance products and insurance-based wealth accumulation products, driven by a customer-centric strategy and leveraging the asset management expertise and products managed by our Global Wealth and Asset Management segment. Present in many of Asia's largest and fastest growing economies, we are well positioned to capitalize on the attractive underlying demographics of the region, underpinned by a rigorous focus on creating value for our customers, employees and shareholders.

We have insurance operations in 11 markets: Japan, Hong Kong, Macau, Singapore, mainland China, Vietnam, Indonesia, the Philippines, Malaysia and Cambodia and have recently received licence to start operations in Myanmar.¹

We have a diversified multi-channel distribution network, including over 95,000 contracted agents and 100 bank partnerships. We also work with many independent agents, financial advisors and brokers. Among our bancassurance partnerships we have eight exclusive partnerships, including a long-term partnership with DBS Bank across Singapore, Hong Kong, mainland China and Indonesia, that give us access to almost 15 million bank customers.

In 2019, Asia contributed 33% of the Company's core earnings from operating segments and, as at December 31, 2019, accounted for 10% of the Company's assets under management and administration.

a. Profitability

Asia reported net income attributed to shareholders of \$1,935 million in 2019 compared with \$1,704 million in 2018. Net income attributed to shareholders is comprised of core earnings, which was \$2,005 million in 2019 compared with \$1,766 million in 2018, and items excluded from core earnings, which amounted to a net charge of \$70 million for 2019 compared with a net charge of \$62 million in 2018.

Expressed in U.S. dollars, the presentation currency of the segment, net income attributed to shareholders was US\$1,457 million in 2019 compared with US\$1,317 million in 2018 and core earnings were US\$1,511 million in 2019 compared with US\$1,363 million in 2018. Items excluded from core earnings are outlined in the table below and amounted to a net charge of US\$54 million in 2019 and a net charge of US\$46 million in 2018.

Core earnings in 2019 increased 11% compared with 2018, after adjusting for the impact of changes in foreign currency exchange rates. Core earnings increased by 26% in Hong Kong and 18% in Asia Other and declined by 19% in Japan. Hong Kong and Asia Other core earnings benefited from higher new business volumes and in-force business growth and in Japan, core earnings were impacted by lower new business volumes. Additionally, Asia core earnings benefited from improved policyholder experience in Hong Kong and Japan. Note, this improvement in policyholder experience does not include the impact on policyholder experience from sales of the recently-launched VHIS products in Hong Kong. These sales did not have a material current period impact on core earnings as experience gains from the release of margins for customers who opted to change their existing medical coverage to the new VHIS product were offset by new business strain.

The table below reconciles net income attributed to shareholders to core earnings for Asia for 2019, 2018 and 2017.

For the years ended December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
Core earnings^{(1),(2)}	\$ 2,005	\$ 1,766	\$ 1,453	\$ 1,511	\$ 1,363	\$ 1,121
Items to reconcile core earnings to net income attributed to shareholders:						
Investment-related experience related to fixed income trading, market value increases in excess of expected alternative assets investment returns, asset mix changes and credit experience	195	284	242	147	219	186
Direct impact of equity markets and interest rates and variable annuity guarantee liabilities ⁽³⁾	(258)	(375)	12	(196)	(287)	2
Change in actuarial methods and assumptions	(7)	27	166	(5)	21	132
Reinsurance transactions	-	5	-	-	4	-
Other ⁽⁴⁾	-	(3)	(39)	-	(3)	(31)
Net income attributed to shareholders⁽²⁾	\$ 1,935	\$ 1,704	\$ 1,834	\$ 1,457	\$ 1,317	\$ 1,410

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

⁽²⁾ 2018 comparatives for core earnings and net income attributed to shareholders have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

⁽³⁾ The direct impact of markets in 2019 was a charge of US\$196 million and included a charge of US\$174 million related to fixed income reinvestment rates and a charge of US\$88 million related to changes to the URR, partially offset by a gain of US\$66 million related to equity markets and variable annuity guarantee liabilities. The charge in 2018 primarily related to the impact of equity markets on general fund equity investments supporting policy liabilities.

⁽⁴⁾ Other items in 2017 included restructuring costs in Thailand.

b. Growth

(all percentages quoted are on a constant exchange rate basis)

Annualized premium equivalent ("APE") sales in 2019 were US\$3,224 million, representing an increase of 4% compared with 2018. Higher sales in Hong Kong and Asia Other were partially offset by lower sales in Japan. In Japan, APE sales in 2019 were US\$835 million, a decrease of 24% compared with 2018 due to changes in COLI product tax rules. Hong Kong APE sales in 2019

¹ In 2019, we made the decision to exit Thailand, and have reached an agreement to sell the operation, subject to regulatory approval.

were US\$859 million, an increase of 33% compared with 2018, driven by the success of our recently-launched VHIS and Qualifying Deferred Annuity products, as well as participating products launched at the beginning of the year. Asia Other APE sales in 2019 were US\$1,530 million, a 14% increase compared with 2018 driven by strong growth in China, Vietnam and Malaysia.

New business value (“NBV”) was US\$1,202 million in 2019, an increase of 8% compared with 2018. We experienced growth across all of our businesses in Asia, except Japan. In Japan, NBV in 2019 was US\$259 million, a decrease of 22% compared with 2018 due to lower APE sales. In Hong Kong, NBV in 2019 was US\$536 million, an increase of 28% compared with 2018 driven by higher sales. Asia Other NBV in 2019 was US\$407 million, an increase of 13% compared to 2018, with growth in most of our markets. The new business value margin (“NBV margin”)¹ was 39.8% in 2019, an increase of 1.8 percentage points compared with 2018.

APE Sales and NBV

For the years ended December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
Annualized premium equivalent sales ⁽¹⁾	\$ 4,278	\$ 4,012	\$ 3,747	\$ 3,224	\$ 3,094	\$ 2,887
New business value ⁽¹⁾	1,595	1,443	1,201	1,202	1,112	926

⁽¹⁾ This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

Assets under Management

Asia’s assets under management were US\$93.4 billion as at December 31, 2019, an increase of US\$14.2 billion or 17% compared with December 31, 2018, driven by net customer inflows of US\$10.2 billion and market growth during 2019.

Assets under Management⁽¹⁾

As at December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
General fund ⁽²⁾	\$ 100,418	\$ 88,776	\$ 72,777	\$ 77,304	\$ 65,075	\$ 58,009
Segregated funds	20,968	19,333	18,917	16,138	14,176	15,074
Total assets under management	\$ 121,386	\$ 108,109	\$ 91,694	\$ 93,442	\$ 79,251	\$ 73,083

⁽¹⁾ This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

⁽²⁾ The 2018 comparative for general fund assets under management has been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

Revenue

Total revenue in 2019 of US\$21.6 billion increased US\$6.4 billion compared with 2018, of which US\$5.3 billion related to a net increase in realized and unrealized investment gains and losses, primarily due to the impact of the decline in interest rates and improvement in equity markets in 2019. Revenue before net realized and unrealized investment gains and losses increased US\$1.1 billion compared with 2018 due to an increase in net premium income. The net premium income increase was primarily driven by the growth of new and in-force business in Hong Kong and Asia Other, partly offset by a decline in new business in Japan.

Revenue

For the years ended December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
Gross premiums	\$ 20,724	\$ 18,768	\$ 16,215	\$ 15,620	\$ 14,483	\$ 12,500
Premiums ceded to reinsurers	(717)	(656)	(503)	(540)	(507)	(384)
Net premium income	20,007	18,112	15,712	15,080	13,976	12,116
Investment income ⁽¹⁾	2,570	2,355	2,000	1,938	1,817	1,543
Other revenue	1,215	1,296	934	917	1,000	719
Revenue before net realized and unrealized investment gains and losses	23,792	21,763	18,646	17,935	16,793	14,378
Net realized and unrealized investment gains and losses ⁽²⁾	4,881	(2,053)	2,044	3,670	(1,599)	1,563
Total revenue	\$ 28,673	\$ 19,710	\$ 20,690	\$ 21,605	\$ 15,194	\$ 15,941

⁽¹⁾ The 2018 comparative for investment income has been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

⁽²⁾ See “Financial Performance – Impact of Fair Value Accounting” above.

¹ This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

c. Strategic Highlights

Asia continues to be a core driver of growth for Manulife, supported by a clear strategy, a focus on execution, a strong team, and a diversified footprint in 11 markets with a compelling economic backdrop. We operate in many of the fastest growing markets in the world, and middle-class emergence, combined with an estimated doubling of household wealth in Asia from 2015 to 2025¹, will continue to drive demand for financial solutions.

We continued to accelerate our growth by expanding our distribution reach and we implemented several changes to enhance customer experience. In 2019, we:

- Increased the number of agents by 20% to over 95,000. Our number of Million Dollar Round Table agents has increased to 3,500, up by 25% over 2018.
- Continued our momentum in bancassurance as we entered into a cooperation agreement in Vietnam. As noted above, we have eight exclusive bancassurance partnerships, including a major pan-Asia partnership with DBS Bank, giving us access to almost 15 million bank customers; and
- Launched Manulife Financial Advisors Company, a wholly owned independent agency in Japan, which will distribute Manulife insurance solutions as well as select products from other insurance providers.

We grew our customer base to more than 11 million customers and saw positive momentum in rNPS, achieving an overall score of 9.4. We became much more digital and customer-centric, rolling out a number of key customer initiatives and advanced our digital strategy. In 2019, we:

- Launched an analytics-supported online end-to-end platform in collaboration with DBS Bank, where customers can purchase insurance solutions directly in Singapore;
- Enhanced our eClaims platform in Hong Kong, Japan and Vietnam to include more types of claims, increased the claims submission threshold and improved the efficiency of claims processing;
- Launched our ManulifeMOVE behavioral insurance program in Vietnam and Cambodia and increased the number of eligible products and retail partners available on the platform.
- We ended 2019 with over 500,000 policyholders enrolled in ManulifeMOVE in Asia, double the number of policyholders enrolled at the end of 2018; and
- Entered into a long-term strategic partnership in mainland China with HaoDF.com to explore opportunities for innovative products and services allowing us to expand on our distribution reach.

We made progress on building our high performing team. Our overall employee engagement score improved, contributing to the year-on-year improvement for the wider group. We secured talent in key leadership roles, appointing General Managers in Hong Kong, the Philippines and Indonesia.

¹ Source: Asia household wealth in 2015 – Economic Intelligence Unit; and in 2025 – Manulife & Oliver Wyman estimates

3. Canada

Our Canada segment is a leading financial services provider, offering insurance products, insurance-based wealth accumulation products and banking services, and leveraging the asset management expertise and products managed by our Global Wealth and Asset Management segment. The comprehensive solutions we offer target a broad range of customer needs and foster holistic long-lasting relationships.

We offer financial protection solutions to middle- and upper-income individuals, families and business owners through a combination of competitive products, professional advice and quality customer service. We provide group life, health and disability insurance solutions to Canadian employers, with more than 23,000 Canadian businesses and organizations entrusting their employee benefit programs to Manulife's Group Insurance. We also provide life, health and specialty products, such as travel insurance, through advisors, sponsor groups and associations, as well as direct-to-customer. We continue to increase the proportion of products with behavioural insurance features.

Manulife Bank offers flexible debt and cash flow management solutions as part of a customer's overall financial plan. Products include savings and chequing accounts, GICs, lines of credit, investment loans, mortgages and other specialized lending programs, offered through financial advisors supported by a broad distribution network.

In 2019, Canada contributed 19% of the Company's core earnings from operating segments and, as at December 31, 2019, accounted for 13% of the Company's assets under management and administration.

a. Profitability

Canada's full year 2019 net income attributed to shareholders was \$1,122 million compared with \$982 million in 2018. Net income attributed to shareholders is comprised of core earnings, which was \$1,201 million in 2019 compared with \$1,327 million in 2018, and items excluded from core earnings, which amounted to a net charge of \$79 million for 2019 compared with a net charge of \$345 million in 2018. Items excluded from core earnings are outlined in the table below.

The \$126 million or 9% decrease in core earnings was driven by less favourable policyholder experience, the non-recurrence of the 2018 gain from the release of provisions for uncertain tax positions and the impact on earnings of actions taken over the last 12 months to improve the capital efficiency of our legacy businesses. These items were partially offset by higher Manulife Bank core earnings, gains from the second phase of our segregated fund transfer program and improved margins across individual insurance due to the success of Manulife Par.

The table below reconciles net income attributed to shareholders to core earnings for Canada for 2019, 2018 and 2017.

For the years ended December 31,
(\$ millions)

	2019	2018	2017
Core earnings^{(1),(2)}	\$ 1,201	\$ 1,327	\$ 1,209
Items to reconcile core earnings to net income attributed to shareholders:			
Investment-related experience related to fixed income trading, market value increases in excess of expected alternative assets investment returns, asset mix changes and credit experience	477	240	(99)
Direct impact of equity markets and interest rates and variable annuity guarantee liabilities ⁽³⁾	(414)	(307)	(227)
Change in actuarial methods and assumptions	(108)	(370)	36
Charge related to decision to change portfolio asset mix supporting our legacy businesses	–	–	(343)
Reinsurance transactions	(30)	102	–
Tax-related items and other ⁽⁴⁾	(4)	(10)	(22)
Net income attributed to shareholders⁽²⁾	\$ 1,122	\$ 982	\$ 554

(1) This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

(2) 2018 comparatives for core earnings and net income attributed to shareholders have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

(3) The direct impact of markets in 2019 was a charge of \$414 million and included a charge of \$270 million related to fixed income reinvestment rates and a charge of \$254 million related to changes to the URR, partially offset by a gain of \$110 million related to the direct impact of equity markets and variable annuity guarantee liabilities. The charge in 2018 is primarily related to direct impact of equity markets and variable annuity guarantee liabilities and fixed income reinvestment rates.

(4) The 2019 charge of \$4 million relates to the impact of tax rate changes in the province of Alberta, Canada. The 2018 and 2017 charges of \$10 million and \$22 million, respectively, included integration and acquisition items.

b. Growth

APE sales were \$1,057 million in 2019, an increase of \$82 million or 8% compared with 2018. Individual insurance APE sales in 2019 of \$396 million increased \$107 million or 37% compared with 2018 due to higher par product sales. Group insurance APE sales in 2019 of \$449 million decreased \$7 million or 2% compared with 2018, due to variability in large-case group insurance market, partially offset by higher small and mid-size business sales. Annuities APE sales in 2019 of \$212 million decreased \$18 million or 8% compared with 2018 due to our focus on lower risk segregated fund products.

Sales

For the years ended December 31,
(\$ millions)

	2019	2018	2017
APE sales ⁽¹⁾	\$ 1,057	\$ 975	\$ 1,366

(1) This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Manulife Bank average net lending assets were \$21.9 billion in 2019, up \$0.9 billion or 4% from 2018.

Assets under Management

Assets under management of \$151.3 billion as at December 31, 2019 increased by \$9.3 billion or 7% from \$141.9 billion at December 31, 2018, due to business growth and the favourable impact of markets.

Assets under Management⁽¹⁾

As at December 31,
(\$ millions)

	2019	2018	2017
General fund ⁽²⁾	\$ 115,613	\$ 108,607	\$ 108,160
Segregated funds	35,645	33,306	36,460
Total assets under management	\$ 151,258	\$ 141,913	\$ 144,620

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

⁽²⁾ The 2018 comparative for general fund assets under management has been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

Revenue

Total revenue of \$19.6 billion in 2019 increased \$6.0 billion from \$13.6 billion in 2018. Revenue before net realized and unrealized investment gains and losses of \$14.8 billion in 2019 decreased \$0.2 billion from \$15.0 billion in 2018. The decrease in other revenue from changes made to reinsurance agreements in 2019 and lower large single premium deposits in group insurance was partially offset by higher investment income.

Revenue

For the years ended December 31,
(\$ millions)

	2019	2018	2017
Gross premiums	\$ 10,667	\$ 10,974	\$ 10,124
Premiums ceded to reinsurers	(1,592)	(1,547)	(5,359)
Net premium income	9,075	9,427	4,765
Investment income ⁽¹⁾	4,597	4,119	3,958
Other revenue	1,088	1,446	1,862
Revenue before net realized and unrealized investment gains and losses	14,760	14,992	10,585
Net realized and unrealized investment gains and losses ⁽²⁾	4,849	(1,394)	602
Total revenue	\$ 19,609	\$ 13,598	\$ 11,187

⁽¹⁾ The 2018 comparative for investment income has been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

⁽²⁾ See "Financial Performance – Impact of Fair Value Accounting" above.

c. Strategic Highlights

In 2019, we continued to revitalize and modernize our business by further expanding our product offerings and continuing to build customer-centric digital platforms. We executed several significant actions on our legacy business and successfully executed on our expense reduction strategy to strengthen financial results and improve the risk-return profile in our home market. Our Canada segment remains focused on building and fostering holistic long-lasting relationships by expanding and integrating our insurance, insurance-based wealth accumulation and banking solutions to meet customers' needs and by leveraging the strength of our group franchise.

We are revitalizing our business by expanding our product offerings and modernizing our delivery process. In 2019, we:

- Launched an additional par product to expand our participating customer solutions;
- Introduced the Group Insurance Manulife Vitality program, the first evidence-rich program of its kind in Canada, designed to encourage participants to make healthy choices using proven behavioural science;
- Continued to focus on improving the health of Canadians and launched a new two-step opioid management program focused on prevention and early intervention;
- Enhanced our Group Benefits small business offering, providing improved product design, which includes improved pricing and an updated advisor experience;
- Launched our new digital All-In Banking Package, coupled with Manulife's first ever artificial intelligence-driven chatbot, helping Canadians develop better financial habits and improve their financial well-being; and
- Launched a new advertising campaign, "A little can do a lot" encouraging Canadians to improve their financial habits by taking little steps to achieve big goals.

We executed on a number of initiatives to expand our digital capabilities focused on providing personalized customer service. In 2019, we:

- Launched a new tool providing customers with access to virtual medical consultations anytime and anywhere;

- Continued to digitize our operations and achieved over four million robotics-processed transactions, making it easier for our customers to do business with us;
- Partnered with Blink, an Ireland-based travel insurtech, to offer our travel insurance customers a real-time travel disruption solution; and
- Won the 2018 International Service Excellence Award as the Customer Service Project of the Year for our Life Moments initiative supporting Canadians during life's biggest events.

We are also focused on optimizing capital in our legacy businesses and in 2019 we released approximately \$450 million of capital. In 2019, we entered into two new reinsurance transactions and renegotiated some of our existing reinsurance agreements to reduce risk and free up a total of \$325 million of capital. These transactions included reinsuring the mortality and lapse risk on a portion of our Canadian legacy term and universal life policies, mortality risk on some of our Par business as well as longevity risk on our Canadian individual annuities block. In addition, we introduced the second phase of our segregated fund transfer program, providing an opportunity to some of our legacy segregated fund customers to convert their policy to a less capital-intensive product which offers them increased flexibility and higher potential returns. The program along with other initiatives released approximately \$125 million of capital. Legacy optimization initiatives in the Canada segment have contributed approximately \$1.0 billion of cumulative capital benefit through December 31, 2019, including \$450 million in 2019.

4. U.S.

Our U.S. segment provides a range of life insurance products, insurance-based wealth accumulation products, and has an in-force long-term care insurance business and an in-force annuity business.

The insurance products we offer are designed to provide estate, business and income-protection solutions for high net worth, emerging affluent markets and the middle market, and to leverage the asset management expertise and products managed by our Global Wealth and Asset Management business. Behavioural insurance features are standard on all our new insurance product offerings. The primary distribution channel is licenced financial advisors, with some direct-to-consumer insurance business. With the support from our direct-to-consumer capabilities, we aim to establish lifelong customer relationships that benefit from our holistic protection and wealth product offerings in the future.

Our in-force long-term care insurance policies provide coverage for the cost of long-term services and support.

Our in-force annuity business includes fixed deferred, variable deferred, and payout products.

In 2019, U.S. contributed 31% of the Company's core earnings from operating segments and, as at December 31, 2019, accounted for 20% of the Company's assets under management and administration.

a. Profitability

U.S. reported net income attributed to shareholders of \$1,428 million in 2019 compared with net income attributed to shareholders of \$2,291 million in 2018. Net income attributed to shareholders is comprised of core earnings, which was \$1,876 million in 2019 compared with \$1,789 million in 2018, and items excluded from core earnings, which amounted to a net charge of \$448 million in 2019 compared with a net gain of \$502 million in 2018.

Expressed in U.S. dollars, the functional currency of the segment, 2019 net income attributed to shareholders was US\$1,074 million compared with a net income attributed to shareholders of US\$1,768 million in 2018 and core earnings were US\$1,414 million in 2019 compared with US\$1,380 million in 2018. Items excluded from core earnings are outlined in the table below and amounted to a net charge of US\$340 million in 2019 compared with a net gain of US\$388 million in 2018.

The US\$34 million increase in core earnings was driven by the impact of higher sales volumes and improved product margins and a true-up of prior year tax provisions partially offset by actions taken over the last 12 months to improve the capital efficiency of our legacy businesses and policyholder experience losses in 2019 compared with small gains in 2018 across all businesses.

The table below reconciles net income attributed to shareholders to core earnings for the U.S. for 2019, 2018 and 2017.

For the years ended December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
Core earnings^{(1),(2)}	\$ 1,876	\$ 1,789	\$ 1,609	\$ 1,414	\$ 1,380	\$ 1,241
Items to reconcile core earnings to net income attributed to shareholders:						
Investment-related experience related to fixed income trading, market value increases in excess of expected alternative assets investment returns, asset mix changes and credit experience	66	17	343	49	10	263
Direct impact of equity markets and interest rates and variable annuity guarantee liabilities ⁽³⁾	(693)	236	505	(525)	191	384
Change in actuarial methods and assumptions	71	286	(245)	54	219	(195)
Charge related to decision to change portfolio asset mix supporting our legacy businesses	–	–	(689)	–	–	(542)
Reinsurance transactions	111	68	–	84	51	–
Tax-related items and other ⁽⁴⁾	(3)	(105)	(2,724)	(2)	(83)	(2,143)
Net income (loss) attributed to shareholders⁽²⁾	\$ 1,428	\$ 2,291	\$ (1,201)	\$ 1,074	\$ 1,768	\$ (992)

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

⁽²⁾ The 2018 comparatives for core earnings and net income (loss) attributed to shareholders have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

⁽³⁾ The direct impact of markets in 2019 was a charge of US\$525 million and included a charge US\$621 million related to fixed income reinvestment rates and a charge of US\$98 million related to changes to the URR, partially offset by a gain of US\$194 million related to the direct impact of equity markets and variable annuity guarantee liabilities. The gain in 2018 is primarily related to fixed income reinvestment rates partially offset by charges from the direct impact of equity markets and variable annuity guarantee liabilities.

⁽⁴⁾ Tax-related items and other in 2019 was fees related to legacy transactions. Charges in 2018 and 2017 primarily relate to U.S. tax reform.

b. Growth

U.S. APE sales in 2019 of US\$530 million increased 24% compared with 2018, driven primarily by higher domestic and international universal life sales. Higher domestic universal life sales included the benefit of sales in advance of anticipated regulatory changes. Sales of products with the John Hancock Vitality PLUS feature in 2019 were US\$188 million, an increase of 86% compared with 2018.

Sales

For the years ended December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
APE sales ⁽¹⁾	\$ 702	\$ 553	\$ 603	\$ 530	\$ 426	\$ 464

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Assets under Management

U.S. assets under management of US\$177 billion as at December 31, 2019 increased by 8% from December 31, 2018. The increase was driven by the favourable impact of markets partially offset by the continued run-off of our annuities business, and the reinsurance of the New York portion of the payout annuity block in 2019.

Assets under Management⁽¹⁾

As at December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
General fund ⁽²⁾	\$ 153,731	\$ 150,772	\$ 150,837	\$ 118,364	\$ 110,520	\$ 120,237
Segregated funds	76,625	72,874	77,998	58,996	53,420	62,174
Total assets under management	\$ 230,356	\$ 223,646	\$ 228,835	\$ 177,360	\$ 163,940	\$ 182,411

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

⁽²⁾ The 2018 comparatives for general fund assets under management have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

Revenue

Total revenue in 2019 of US\$18.5 billion increased US\$18.0 billion compared with 2018. Revenue before net realized and unrealized investment gains and losses was US\$12.2 billion, an increase of US\$7.3 billion compared with 2018 primarily due to the impact on premiums ceded to reinsurers in 2018 when we reinsured substantially all of our legacy individual and group payout annuity business (the portion related to the New York business closed in 2019).

Revenue

For the years ended December 31, (\$ millions)	Canadian \$			US \$		
	2019	2018	2017	2019	2018	2017
Gross premium income	\$ 9,588	\$ 9,335	\$ 9,939	\$ 7,227	\$ 7,201	\$ 7,667
Premiums ceded to reinsurers	(3,204)	(12,961)	(2,317)	(2,414)	(9,878)	(1,786)
Net premium income	6,384	(3,626)	7,622	4,813	(2,677)	5,881
Investment income ⁽¹⁾	7,140	7,291	7,382	5,382	5,624	5,689
Other revenue	2,654	2,542	3,040	2,000	1,966	2,341
Revenue before items noted below	16,178	6,207	18,044	12,195	4,913	13,911
Net realized and unrealized investment gains and losses ⁽²⁾	8,416	(5,621)	3,274	6,320	(4,423)	2,495
Total revenue	\$ 24,594	\$ 586	\$ 21,318	\$ 18,515	\$ 490	\$ 16,406

⁽¹⁾ The 2018 comparative for investment income has been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

⁽²⁾ See "Financial Performance – Impact of Fair Value Accounting" above.

c. Strategic Highlights

At John Hancock, we are focused on building more holistic and long-lasting customer relationships by offering innovative products and solutions and making it easier for customers to do business with us. We are focused on revitalizing our insurance business by expanding our product offerings, modernizing the delivery process, enhancing customer experience, and opportunistically evaluating potential adjacent market expansion.

In 2019, we:

- Continued to redefine insurance and how we interact with customers through our behavioural insurance offerings; behavioural insurance is increasingly recognized as a differentiator as evidenced by our Customer Net Promoter Score of 30 and number of enrollees;
- Achieved increased sales of policies with the John Hancock Vitality PLUS rider for four consecutive quarters.
- Launched the John Hancock Aspire program – life insurance designed for people living with diabetes that builds on the success of John Hancock Vitality;
- Improved the new business profitability of our brokerage life insurance business by improving pricing, reducing expenses, and enhancing our focus on sales support and training resulting in the highest new business value reported over the past ten years; and
- Continued to validate our direct-to-consumer offerings through testing and innovation, incorporating what we learned to build a cohesive direct channel as we seek to develop deeper relationships with our customers.

We continued to actively manage our legacy businesses and maintain sharp focus on expenses across all business lines. In 2019, we:

- Completed legacy optimization initiatives in the U.S. segment that contributed over \$1.4 billion of cumulative capital benefits through December 31, 2019, including \$775 million in 2019;
- Made progress on our portfolio optimization initiative, completing two new reinsurance transactions on universal life blocks that resulted in a capital benefit of \$265 million;
- Initiated an Annuity Guaranteed Minimum Withdrawal Benefit offer program for consumers that released nearly \$77 million of capital in 2019 with larger capital releases expected in future years;¹
- Built upon the capital initiatives taken last year, by completing the reinsurance of the New York portion of individual and group payout annuity policies. These transactions along with the impacts from the sale of ALDA enabled by the reinsurance generated cumulative capital benefits of \$810 million through the end of the year with another \$90 million expected to be realized early in 2020¹; and
- Continued to make progress in securing long-term care premium rate increases and introduced an innovative cost-sharing option to our long-term care customers to manage premium costs.

¹ See “Caution regarding forward-looking statements” above.

5. Global Wealth and Asset Management

Our Global Wealth and Asset Management segment serves individual investors and institutional clients in three business lines: Retirement, Retail and Institutional Asset Management. We have operations in 19 markets¹, and leverage our Asia, Canada and U.S. segments.

Retirement provides financial advice, investment products and electronic record-keeping services to over seven million individual participants in North America and Asia. In North America, our Canadian Group Retirement business focuses on providing retirement solutions through defined contribution and defined benefit plans; and in the United States, John Hancock Retirement Plan Services provides employer sponsored retirement plans and services personal retirement accounts for former client employees. In Asia, we provide retirement offerings to employers and individuals, including Mandatory Provident Fund (“MPF”) schemes and administration in Hong Kong.

Retail distributes investment funds through intermediaries in North America, Europe and Asia, and operates a manager-of-managers model, which identifies and sources investment strategies across the world, both proprietary and external. In Canada, we also provide personalized investment management, private banking and estate solutions to affluent clients.

Institutional Asset Management provides investment management solutions to over 700 institutional clients (such as pension plans, foundations, endowments and financial institutions) globally across major asset classes including equities, fixed income, and alternative assets (including real estate, timberland, farmland, private equity/debt, infrastructure, and liquid alternatives). In addition, we also offer multi-asset investment management solutions for a broad range of clients’ investment needs.

In 2019, Global WAM contributed 17% of the Company’s core earnings from operating segments and, as at December 31, 2019, accounted for 57% of the Company’s assets under management and administration.

a. Profitability

Global WAM’s 2019 net income attributed to shareholders was \$1,022 million compared with \$954 million in 2018, core earnings were \$1,021 million in 2019 compared with \$985 million in 2018. Items excluded from core earnings are outlined in the table below and amounted to a net gain of \$1 million in 2019 compared with a net charge of \$31 million in 2018.

Core earnings increased \$36 million or 2% on a constant exchange rate basis driven by higher average asset levels partially offset by a higher effective tax rate due to geographical business mix, net of tax benefits.

The table below reconciles net income attributed to shareholders to core earnings for the Global WAM segment for 2019, 2018 and 2017.

For the years ended December 31, (\$ millions)	2019	2018	2017
Core earnings⁽¹⁾			
Asia	\$ 289	\$ 257	\$ 210
Canada	319	266	253
U.S.	413	462	353
Core earnings	1,021	985	816
Items to reconcile core earnings to net income attributed to shareholders:			
Tax-related items and other ⁽²⁾	1	(31)	262
Net Income attributed to shareholders	\$ 1,022	\$ 954	\$ 1,078

⁽¹⁾ This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

⁽²⁾ The 2018 charge of \$31 million primarily relates to the integration of businesses acquired from Standard Chartered and the 2017 net gain of \$262 million includes the impact related to tax reform of \$308 million partially offset by the integration of businesses acquired from Standard Chartered of \$46 million.

In 2019, core EBITDA² for Global WAM was \$1,536 million, \$515 million higher than core earnings. In 2018, core EBITDA was \$1,497 million, \$512 million higher than core earnings. The increase in core EBITDA of \$39 million or 1% on a constant exchange rate basis was driven by higher average asset levels, as mentioned above.

Core EBITDA

For the years ended December 31, (\$ millions)	2019	2018	2017
Core earnings⁽¹⁾	\$ 1,021	\$ 985	\$ 816
Amortization of deferred acquisition costs and other depreciation	311	301	344
Amortization of deferred sales commissions	81	98	99
Core income tax expense (recovery)	123	113	167
Core EBITDA⁽¹⁾	\$ 1,536	\$ 1,497	\$ 1,426

⁽¹⁾ This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” below.

¹ United States, Canada, Japan, Hong Kong, Macau, Singapore, Taiwan, Indonesia, Vietnam, Malaysia, the Philippines, the United Kingdom, Ireland, Switzerland, and mainland China. In addition, we have timberland/farmland operations in Australia, New Zealand, Chile and Brazil.

² This item is a Non-GAAP measure. See “Performance and Non-GAAP Measures” below.

b. Growth

Gross Flows and Net Flows

In 2019, gross flows of \$114.2 billion were \$4.8 billion or 6% lower than 2018 as lower retail and institutional asset management flows more than offset higher retirement flows. In retail, gross flows were \$3.8 billion or 8% lower than 2018 due to lower industry flows into active strategies and investor preference for conservative fixed income exposures in the U.S. and lower flows into mainland China retail money market funds in Asia. In institutional asset management, gross flows were \$4.8 billion or 25% lower than 2018 as we had several large fundings in 2018. In retirement, gross flows were \$3.8 billion or 6% higher than 2018, with growth across all geographies, driven by higher new plan sales and recurring contributions. WAM net outflows were \$0.9 billion compared with net inflows of \$1.6 billion in 2018. The decrease was driven by a decision by one institutional client in Canada to internalize the management of several large, primarily fixed income, mandates in 3Q19 totaling \$8.5 billion. This was partially offset by higher retail net inflows across all geographies amid improved market returns and higher retirement gross flows as mentioned above.

Asia WAM

- **Gross flows** in Asia in 2019 were \$21.0 billion, a decrease of 11% compared with 2018. The decline was driven by lower gross flows in institutional asset management due to large contributions from existing and new clients in 2018, and in retail, from lower mainland China money market funds, partially offset by higher gross flows in retirement.
- **Net inflows** in 2019 were \$4.8 billion in 2019 compared with net inflows of \$5.7 billion in 2018, driven by lower gross flows as noted above and higher redemptions in institutional asset management, partially offset by lower redemptions of mainland China retail money market funds.

Canada WAM

- **Gross flows** in Canada in 2019 were \$24.1 billion, an increase of 4% compared with 2018, driven by higher retail gross flows from strong sales across the product line-up and higher new plan sales and recurring contributions in retirement. This was partially offset by the non-recurrence of several large fundings in institutional asset management in 2018.
- **Net outflows** in 2019 were \$3.6 billion compared with net inflows of \$2.0 billion in 2018. The decline was primarily driven by a decision by one institutional client in Canada to internalize the management of several large, primarily fixed income, mandates in 3Q19 totaling \$8.5 billion and a redemption of a large-case retirement plan of \$1.4 billion. This was partially offset by higher gross flows as mentioned above and lower retail redemptions.

U.S. WAM

- **Gross flows** in the U.S. in 2019 were \$69.1 billion, a decrease of 7% compared with 2018. The decline was primarily driven by lower industry flows into active strategies and investor preference for conservative fixed income exposures in retail and the funding of several large mandates in institutional asset management in 2018. This was partially offset by higher new plan sales and recurring contributions in retirement.
- **Net outflows** in 2019 were \$2.0 billion, compared with net outflows of \$6.1 billion in 2018, improving for the fourth consecutive quarter. Compared with 2018, net outflows declined by \$4.1 billion, primarily due to a lower retail redemption rate amid improved market returns and lower plan departures in retirement. This was partially offset by lower gross flows as mentioned above.

Gross Flows and Net Flows⁽¹⁾

For the years ended December 31,
(\$ millions)

	2019	2018	2017
Gross flows	\$ 114,246	\$ 119,002	\$ 121,969
Net flows	(879)	1,563	18,280

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Assets under Management and Administration

In 2019, AUMA for our wealth and asset management businesses were \$681 billion, 16% higher than December 31, 2018 on a constant exchange rate basis. AUMA increased \$74 billion from improved market returns. This was partially offset by an asset disposition of \$1.4 billion and net outflows of \$0.9 billion.

Assets under Management and Administration⁽¹⁾

For the years ended December 31,
(\$ billions)

	2019	2018	2017
Balance January 1,	\$ 609	\$ 609	\$ 554
Acquisitions/Dispositions	(1)	1	–
Net flows	(1)	2	18
Impact of markets and other	74	(3)	37
Balance December 31,	\$ 681	\$ 609	\$ 609

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

Revenue

Total revenue in 2019 of \$5,595 billion increased 1% compared with 2018, driven by higher average asset levels.

Revenue

As at December 31,
(\$ millions)

	2019	2018	2017
Fee income	\$ 5,562	\$ 5,472	\$ 5,158
Investment income	33	(9)	42
Total revenue	\$ 5,595	\$ 5,463	\$ 5,200

c. Strategic Highlights

Leveraging our integrated business model and global scale, we have a clear strategy to pursue high-growth opportunities in the most attractive markets globally through our three business lines: Retirement, Retail and Institutional Asset Management. Our strategy involves becoming a global retirement leader by supporting financial wellness; expanding our presence in regional retail mutual fund distribution across the globe; leveraging a multi-manager model; and providing differentiated active asset management capabilities across high-performing equity and fixed income strategies, outcome-oriented solutions and alternative assets.

We executed on a number of initiatives to accelerate growth in our franchise. In 2019, we:

- Agreed to enter into a joint venture with Mahindra Finance in India. Manulife Investment Management will enter India for the first time through this joint venture which aims to become a premier provider of retail investment solutions;
- Maintained our position as the number one Mandatory Pension Fund scheme sponsor in Hong Kong, based on assets under management and net cash flows¹;
- Launched our first private equity fund-of-funds product with \$2 billion in commitments to the Manulife Private Equity Partners, L.P. (MPEP). This is part of an ongoing effort to provide specialized asset management solutions for global investors. The fund is backed by a global group of institutional and high-net-worth investors from Europe, North America, and Asia; and
- Received top scores (A+ and A) in all submitted categories from the United Nations-supported Principles for Responsible Investment (PRI) annual Environmental, Social and Governance (ESG) assessment report for 2018.

We continued to make progress on our digital customer leader strategy. In 2019, we:

- Introduced a unified global brand for Manulife's Global Wealth & Asset Management businesses: Manulife Investment Management, to better serve our investors worldwide. This unified presence will provide customers and intermediaries with a more consistent, seamless experience in our various investment management businesses;
- Completed the centralization and modernization of our Global Wealth & Asset Management operations, technology and data platforms through the Global Optimization program, utilizing state of the art technology to deliver a robust digital experience for our stakeholders;
- Expanded our personal advice offering by signing an agreement with Morningstar Investment Management LLC to offer Morningstar's advisor managed account services to registered investment advisor ("RIA") firms and their advisors for their retirement plan clients;
- Launched Manulife InvestChoice in Hong Kong, a digitally enabled wrap account service consolidating and managing specially selected mutual fund products provided by Manulife Investment Management and other fund houses; and
- Launched a new retail investments website in Canada which houses our complete suite of solutions in one place and features an extensive investment resource and education hub.

¹ Market share of assets under management and net cash flows by scheme sponsor as reported in the Mercer MPF Market Share Reports for March 31, June 30, September 30, and December 31, 2019.

6. Corporate and Other

Corporate and Other is comprised of investment performance on assets backing capital, net of amounts allocated to the operating segments; financing costs; costs incurred by the corporate office related to shareholder activities (not allocated to the operating segments); our P&C Reinsurance business; as well as our run-off reinsurance operation, including variable annuities and accident and health.

For segment reporting purposes, settlement costs for macro equity hedges and other non-operating items are included in Corporate and Other earnings. This segment is also where we reclassify favourable investment-related experience to core earnings from items excluded from core earnings, subject to certain limits (see "Performance and Non-GAAP Measures" below). In each of the operating segments, we report all investment-related experience in items excluded from core earnings.

a. Profitability

Corporate and Other reported net income attributed to shareholders of \$95 million in 2019 compared with a net loss attributed to shareholders of \$1,131 million in 2018. The net income (loss) attributed to shareholders was comprised of core loss and items excluded from core loss. The core loss was \$99 million in 2019 compared with a core loss of \$257 million in 2018. Items excluded from core loss amounted to a net gain of \$194 million in 2019 compared with a net charge of \$874 million in 2018.

The \$158 million lower core loss was primarily related to gains from the favourable impact of markets on seed money investments in new segregated and mutual funds compared to charges from the decline in markets in 2018, as well as higher investment income and lower interest on external debt. These increases were partially offset by lower gains on AFS equities, higher withholding taxes on future U.S. remittances and the non-recurrence of a net release of P&C provisions in 2018.

The items excluded from core earnings are outlined below.

The table below reconciles the net income (loss) attributed to shareholders to the core loss for Corporate and Other for 2019, 2018 and 2017.

For the years ended December 31, (\$ millions)	2019	2018	2017
Core loss excluding core investment gains ⁽¹⁾	\$ (499)	\$ (657)	\$ (922)
Core investment gains ⁽²⁾	400	400	400
Total core loss⁽²⁾	(99)	(257)	(522)
Items to reconcile core loss to net loss attributed to shareholders:			
Direct impact of equity markets and interest rates ⁽³⁾	588	(411)	(83)
Changes in actuarial methods and assumptions	23	6	8
Investment-related experience related to mark-to-market items ⁽⁴⁾	27	59	81
Reclassification to core investment gains above	(400)	(400)	(400)
Restructuring charge ⁽⁵⁾	–	(263)	–
Tax-related items and other ⁽⁶⁾	(44)	135	755
Net income (loss) attributed to shareholders⁽¹⁾	\$ 95	\$ (1,131)	\$ (161)

⁽¹⁾ The 2018 comparatives for core loss excluding core investment gains and net loss attributed to shareholders have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment

⁽²⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

⁽³⁾ The direct impact of markets in 2019 included gains of \$396 million (2018 – charges of \$284 million) related to the sale of AFS bonds. Other gains of \$192 million in 2019 were mostly from fixed income investment supporting a portion of the capital in Asia that are classified as fair value through profit and loss reported as surplus investment in Asia.

⁽⁴⁾ Investment-related experience includes mark-to-market gains or losses on ALDA assets other than gains on AFS equities and seed money investments in new segregated or mutual funds.

⁽⁵⁾ Please see "Manulife Financial Corporation – Profitability" above for explanation of the restructuring charge.

⁽⁶⁾ Tax-related items and other charges in 2019 are due to a tax rate change in the province of Alberta, Canada.

Revenue

Revenue of \$1,099 million in 2019 compared with a loss of \$385 million in 2018 primarily related to investment income. The increase in investment income includes \$1,024 million related to AFS equities, seed capital and AFS bonds.

Revenue

For the years ended December 31, (\$ millions)	2019	2018	2017
Net premium income	\$ 112	\$ 98	\$ 110
Investment income (loss) ⁽¹⁾	1,073	(211)	285
Other revenue ⁽²⁾	(120)	(328)	(247)
Revenue before net realized and unrealized investment gains and losses and on the macro hedge program	1,065	(441)	148
Net realized and unrealized investment gains and losses ⁽³⁾ and on the macro hedge program	34	56	(220)
Total revenue	\$ 1,099	\$ (385)	\$ (72)

- ⁽¹⁾ The 2018 comparative for investment income has been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.
- ⁽²⁾ Includes a consolidation adjustment related to asset management fees earned by Manulife Investment Management from affiliated business (the offset to the consolidation adjustment is investment expense).
- ⁽³⁾ See “Manulife Financial Corporation – Impact of Fair Value Accounting” above.

b. Strategic Highlights

Our P&C Reinsurance business provides substantial retrocessional capacity for a very select clientele in the property and casualty reinsurance market. The business is largely non-correlated to Manulife’s other businesses and helps diversify our overall business mix. We manage the risk exposure of this business in relation to the total Company balance sheet risk and volatility as well as the prevailing market pricing conditions. The business is renewable annually, and we currently estimate our exposure limit in 2020 for a single event to be approximately US\$275 million (net of reinstatement premiums) and for multiple events to be approximately US\$475 million (net of all premiums).

7. Investments

Our investment philosophy for the General Fund is to invest in an asset mix that optimizes our risk adjusted returns and matches the characteristics of our underlying liabilities. We follow a bottom up approach which combines our strong asset management skills with an in-depth understanding of the characteristics of each investment. We invest in a diversified mix of assets, including a variety of alternative long-duration asset classes. Our diversification strategy has historically produced superior risk adjusted returns while reducing overall risk. We use a disciplined approach across all asset classes, and we do not chase yield in the riskier end of the fixed income or alternative asset market. Our risk management strategy is outlined in the “Risk Management” section below.

a. General Fund Assets

As at December 31, 2019, our General Fund invested assets totaled \$378.5 billion compared with \$353.7 billion at the end of 2018. The following table shows the asset class composition as at December 31, 2019 and December 31, 2018.

As at December 31, (\$ billions)	2019			2018		
	Carrying value	% of total	Fair value	Carrying value	% of total	Fair value
Cash and short-term securities	\$ 20.3	5	\$ 20.3	\$ 16.2	5	\$ 16.2
Debt Securities and Private Placement Debt						
Government bonds	73.4	20	73.4	70.0	20	70.0
Corporate bonds	121.3	32	121.3	112.7	32	112.7
Securitized / asset-backed securities	3.4	1	3.4	2.9	1	2.9
Private placement debt	38.0	10	41.8	35.7	10	36.1
Mortgages	49.4	13	51.5	48.4	14	48.6
Policy loans and loans to bank clients	8.2	2	8.2	8.2	2	8.2
Public equities	22.8	6	22.8	19.2	5	19.2
Alternative Long-Duration Assets (“ALDA”)						
Real Estate	12.9	4	14.3	12.8	4	13.9
Infrastructure	8.9	2	9.0	8.0	2	8.1
Timberland and Farmland	4.7	1	5.2	4.5	1	5.1
Private Equity	6.4	2	6.4	6.8	2	6.8
Oil & Gas	3.2	1	3.3	3.4	1	3.5
Other ALDA	1.7	0	1.7	0.8	0	0.8
Leveraged Leases and Other	3.9	1	3.9	4.1	1	4.1
Total general fund invested assets	\$ 378.5	100	\$ 386.5	\$ 353.7	100	\$ 356.2

The carrying values for invested assets are generally equal to their fair values, however, mortgages and private placement debt are carried at amortized cost; loans to bank clients are carried at unpaid principal balances less allowance for credit losses; real estate held for own use is carried at cost less accumulated depreciation and any accumulated impairment losses; private equity investments, including power and infrastructure and timber, are accounted for as associates using the equity method, or at fair value; and oil and gas investments are carried at cost using the successful efforts method. Certain government and corporate bonds and public equities are classified as AFS, with the remaining classified as “fair value through profit or loss”.

Shareholders’ accumulated other comprehensive pre-tax income (loss) at December 31, 2019 consisted of a \$1,626 million gain for bonds (2018 – loss of \$272 million) and a \$350 million gain for public equities (2018 – gain of \$42 million). Included in the \$1,626 million gain for bonds was a \$497 million loss related to the fair value hedge basis adjustments on AFS bonds (2018 – loss of \$540 million).

b. Debt Securities and Private Placement Debt

We manage our high-quality fixed income portfolio to optimize yield and quality while ensuring that asset portfolios remain diversified by sector, industry, issuer, and geography. As at December 31, 2019, our fixed income portfolio of \$236.1 billion (2018 – \$221.3 billion) was 98% investment grade and 75% was rated A or higher (2018 – 98% and 75%, respectively). Our private placement debt holdings provide diversification benefits (issuer, industry, and geography) and, because they often have stronger protective covenants and collateral than debt securities, they typically provide better credit protection and potentially higher recoveries in the event of default. Geographically, 25% is invested in Canada (2018 – 27%), 47% is invested in the U.S. (2018 – 46%), 4% is invested in Europe (2018 – 3%) and the remaining 24% is invested in Asia and other geographic areas (2018 – 24%).

Debt Securities and Private Placement Debt – by Credit Quality⁽¹⁾

As at December 31, (\$ billions)	2019				2018			
	Debt securities	Private placement debt	Total	% of Total	Debt securities	Private placement debt	Total	% of Total
AAA	\$ 36.1	\$ 1.1	\$ 37.2	16	\$ 36.1	\$ 1.2	\$ 37.3	17
AA	34.3	5.5	39.8	17	32.1	5.0	37.1	17
A	84.2	14.3	98.5	42	78.0	13.3	91.3	41
BBB	40.6	14.1	54.7	23	37.0	14.0	51.0	23
BB	2.0	0.9	2.9	1	1.6	0.7	2.3	1
B & lower, and unrated	0.9	2.1	3.0	1	0.8	1.5	2.3	1
Total carrying value (\$ billions)	\$ 198.1	\$ 38.0	\$ 236.1	100	\$ 185.6	\$ 35.7	\$ 221.3	100

⁽¹⁾ Reflects credit quality ratings as assigned by Nationally Recognized Statistical Rating Organizations (“NRSRO”) using the following priority sequence order: S&P Global Ratings (“S&P”), Moody’s Investors Services (“Moody’s”), DBRS Limited (“DBRS”), Fitch Ratings Inc. (“Fitch”), and Japan Credit Rating. For those assets where ratings by NRSRO are not available, disclosures are based upon internal ratings as described in the “Risk Management” and “Risk Factors” sections below.

Debt Securities and Private Placement Debt – by Sector

As at December 31, Per cent of carrying value	2019			2018		
	Debt securities	Private placement debt	Total	Debt securities	Private placement debt	Total
Government and agency	37	12	33	38	11	33
Utilities	15	41	19	14	44	19
Financial	15	6	13	16	5	14
Industrial	8	10	8	8	10	8
Consumer (non-cyclical)	6	14	8	6	13	7
Energy – Oil & Gas	5	5	5	4	4	4
Energy – Other	4	1	4	4	2	4
Consumer (cyclical)	3	7	3	3	7	3
Securitized (MBS/ABS)	2	1	2	2	1	2
Telecommunications	2	1	2	2	1	2
Basic materials	2	2	2	1	2	2
Technology	1	–	1	1	–	1
Media and internet and other	–	–	–	1	–	1
Total per cent	100	100	100	100	100	100
Total carrying value (\$ billions)	\$ 198.1	\$ 38.0	\$ 236.1	\$ 185.6	\$ 35.7	\$ 221.3

As at December 31, 2019, gross unrealized losses on our fixed income holdings were \$0.6 billion or 0.3% of the amortized cost of these holdings (2018 – \$4.5 billion or 2.0%). Of this amount, \$71 million (2018 – \$278 million) related to debt securities trading below 80% of amortized cost for more than 6 months. Securitized assets represented \$4 million of the gross unrealized losses and none of the amounts trade below 80% of amortized cost for more than 6 months (2018 – \$52 million and none, respectively). After adjusting for debt securities supporting participating policyholder and pass-through products and the provisions for credit included in the insurance and investment contract liabilities, the potential impact to shareholders’ pre-tax earnings for debt securities trading at less than 80% of amortized cost for greater than 6 months was approximately \$48 million as at December 31, 2019 (2018 – \$62 million).

c. Mortgages

As at December 31, 2019, our mortgage portfolio of \$49.4 billion represented 13% of invested assets (2018 – \$48.4 billion and 14%, respectively). Geographically, 65% of the portfolio is invested in Canada (2018 – 63%) and 35% is invested in the U.S. (2018 – 37%). As shown below, the overall portfolio is also diversified by geographic region, property type, and borrower. Of the total mortgage portfolio, 15% is insured (2018 – 15%), primarily by the Canada Mortgage and Housing Corporation (“CMHC”) – Canada’s AAA rated government-backed national housing agency, with 33% of residential mortgages insured (2018 – 35%) and 2% of commercial mortgages insured (2018 – 2%).

As at December 31, (\$ billions)	2019		2018	
	Carrying value	% of total	Carrying value	% of total
Commercial				
Retail	\$ 8.8	18	\$ 8.4	17
Office	8.9	18	8.7	18
Multi-family residential	5.4	11	5.3	11
Industrial	2.5	5	2.8	6
Other commercial	3.2	6	3.0	6
	28.8	58	28.2	58
Other mortgages				
Manulife Bank single-family residential	20.1	41	19.6	41
Agricultural	0.5	1	0.6	1
Total mortgages	\$ 49.4	100	\$ 48.4	100

Our commercial mortgage loans are originated with a hold-for-investment philosophy. They have low loan-to-value ratios, high debt-service coverage ratios, and as at December 31, 2019 there were no loans in arrears. Geographically, of the total commercial mortgage loans, 41% are in Canada and 59% are in the U.S. (2018 – 39% and 61%, respectively). We are diversified by property type and largely avoid risky market segments such as hotels, construction loans and second liens.

Non-CMHC Insured Commercial Mortgages⁽¹⁾

As at December 31,	2019		2018	
	Canada	U.S.	Canada	U.S.
Loan-to-Value ratio ⁽²⁾	62%	56%	63%	57%
Debt-Service Coverage ratio ⁽²⁾	1.48x	1.87x	1.44x	1.85x
Average duration (years)	4.8	6.5	4.8	6.2
Average loan size (\$ millions)	\$17.7	\$18.0	\$16.0	\$19.1
Loans in arrears ⁽³⁾	0.00%	0.00%	0.00%	0.00%

⁽¹⁾ Excludes Manulife Bank commercial mortgage loans of \$361 million (2018 – \$234 million).

⁽²⁾ Loan-to-Value and Debt-Service Coverage are based on re-underwritten cash flows.

⁽³⁾ Arrears defined as over 90 days past due in Canada and over 60 days past due in the U.S.

d. Public Equities

As at December 31, 2019, public equity holdings of \$22.8 billion represented 6% (2018 – \$19.2 billion and 5%) of invested assets and, when excluding assets supporting participating policyholder and pass-through products, represented 2% (2018 – 1%) of invested assets. The portfolio is diversified by industry sector and issuer. Geographically, 27% (2018 – 28%) is held in Canada; 36% (2018 – 36%) is held in the U.S.; and the remaining 37% (2018 – 36%) is held in Asia, Europe and other geographic areas.

Public Equities – classified by type of product-line supported

As at December 31, (\$ billions)	2019		2018	
	Carrying value	% of total	Carrying value	% of total
Participating Policyholders	\$ 11.6	51	\$ 9.3	48
Pass-through products	5.4	24	4.7	25
Corporate and Other segment ⁽¹⁾	4.6	20	4.1	21
Non-participating products	1.2	5	1.1	6
Total public equities	\$ 22.8	100	\$ 19.2	100

⁽¹⁾ Includes \$3.4 billion of AFS equities and \$1.2 billion of seed money investments in new segregated and mutual funds.

e. Alternative Long-Duration Assets (“ALDA”)

Our ALDA portfolio is comprised of a diverse range of asset classes with varying degrees of correlations. The portfolio typically consists of private assets representing investments in varied sectors of the economy which act as a natural hedge against future inflation and serve as an alternative source of asset supply to long-term corporate bonds. In addition to being a suitable match for our long-duration liabilities, these assets provide enhanced long-term yields and diversification relative to traditional fixed income markets. The vast majority of our ALDA are managed in-house.

As at December 31, 2019, ALDA of \$37.8 billion represented 10% (2018 – \$36.2 billion and 10%) of invested assets. The fair value of total ALDA was \$39.9 billion at December 31, 2019 (2018 – \$38.2 billion). The carrying value and corresponding fair value by sector and/or asset type are outlined above (see table in the section “General Fund Assets”).

Real Estate

Our real estate portfolio is diversified by geographic region; of the total fair value of this portfolio, 43% is located in the U.S., 43% in Canada, and 14% in Asia as at December 31, 2019 (2018 – 43%, 42%, and 15%, respectively). This high-quality portfolio has virtually no leverage and is primarily invested in premium urban office towers, concentrated in cities with stable growth, and highly diverse economies, in North America and Asia. The portfolio is well positioned with an average occupancy rate of 94% (2018 – 94%) and an average lease term of 5.7 years (2018 – 5.8 years). During 2019, we executed 1 acquisition representing \$0.1 billion market value of commercial real estate assets (2018 – 1 acquisition and \$0.3 billion). As part of the portfolio optimization initiatives, \$0.4 billion of commercial real estate assets were sold during 2019.

The composition of our real estate portfolio based on fair value is as follows:

As at December 31, (\$ billions)	2019		2018	
	Fair value	% of total	Fair value	% of total
Company Own-Use	\$ 3.3	23	\$ 3.2	23
Office – Downtown	5.6	39	5.2	37
Office – Suburban	1.7	12	1.8	13
Industrial	1.0	7	0.8	6
Residential	1.9	13	1.6	12
Retail	0.4	3	0.4	2
Other	0.4	3	0.9	7
Total real estate⁽¹⁾	\$ 14.3	100	\$ 13.9	100

⁽¹⁾ These figures represent the fair value of the real estate portfolio. The carrying value of the portfolio was \$12.9 billion and \$12.8 billion at December 31, 2019 and December 31, 2018, respectively.

Infrastructure

We invest both directly and through funds in a variety of industry specific asset classes, listed below. The portfolio is well-diversified with over 350 portfolio companies. The portfolio is predominately invested in the U.S. and Canada, but also in the United Kingdom, Europe, South America and Australia. Our power and infrastructure holdings are as follows:

As at December 31, (\$ billions)	2019		2018	
	Carrying value	% of total	Carrying value	% of total
Power generation	\$ 3.9	44	\$ 3.7	47
Transportation (including roads, ports)	2.1	24	1.6	20
Electric and gas regulated utilities	1.0	12	1.1	14
Electricity transmission	0.1	1	0.2	2
Water distribution	0.1	1	0.2	2
Midstream gas infrastructure	0.5	6	0.4	5
Maintenance service, efficiency and social infrastructure	0.2	2	0.1	2
Telecommunications/Tower	0.7	8	0.4	5
Other Infrastructure	0.3	2	0.3	3
Total infrastructure	\$ 8.9	100	\$ 8.0	100

Timberland & Farmland

Our timberland and farmland assets are managed by a proprietary entity, Hancock Natural Resources Group (“HNRG”). In addition to being the world’s largest timberland investment manager for institutional investors,¹ with timberland properties in the U.S., New Zealand, Australia, Chile and Canada, HNRG also manages farmland properties in the U.S., Australia and Canada. The General Fund’s timberland portfolio comprised 22% of HNRG’s total timberland assets under management (“AUM”) (2018 – 26%). The farmland portfolio includes annual (row) crops, fruit crops, wine grapes, and nut crops. The General Fund’s holdings comprised 40% of HNRG’s total farmland AUM (2018 – 39%).

Private Equities

Our private equity portfolio of \$6.4 billion (2018 – \$6.8 billion) includes both directly held private equity and private equity funds. Both are diversified across vintage years and industry sectors.

Oil & Gas

This category is comprised of \$1.0 billion (2018 – \$1.1 billion) in our conventional Canadian oil and gas properties managed by our subsidiary, NAL Resources, and various other oil and gas private equity interests of \$2.2 billion (2018 – \$2.3 billion). Production mix for conventional oil and gas assets in 2019 was approximately 36% crude oil, 47% natural gas, and 17% natural gas liquids (2018 – 36%, 45%, and 19%, respectively). Private equity interests are a combination of both producing and mid-streaming assets.

In 2019, the carrying value of our oil and gas holdings decreased \$0.2 billion and the fair value decreased by \$0.2 billion.

¹ Based on the global timber investment management organization ranking in the *RISI International Timberland Ownership and Investment Database*.

f. Investment Income

For the years ended December 31,
(\$ millions, unless otherwise stated)

	2019	2018
Interest income	\$ 11,488	\$ 11,081
Dividend, rental and other income ⁽¹⁾	2,988	2,829
Impairments	56	(164)
Other, including gains and losses on sale of AFS debt securities	861	(186)
Investment income before realized and unrealized gains on assets supporting insurance and investment contract liabilities and on macro equity hedges	15,393	13,560
Realized and unrealized gains and losses on assets supporting insurance and investment contract liabilities and on macro equity hedges		
Debt securities	11,528	(5,994)
Public equities	2,870	(1,444)
Mortgages and private placements	(36)	(28)
Alternative long-duration assets and other investments	1,262	662
Derivatives, including macro equity hedging program	2,576	(2,224)
	18,200	(9,028)
Total investment income	\$ 33,593	\$ 4,532

⁽¹⁾ Rental income from investment properties is net of direct operating expenses.

In 2019, the \$33.6 billion of investment income (2018 – \$4.5 billion) consisted of:

- \$15.4 billion of investment income before net realized and unrealized gains on assets supporting insurance and investment contract liabilities and on macro equity hedges (2018 – \$13.6 billion); and
- \$18.2 billion of net realized and unrealized gains on assets supporting insurance and investment contract liabilities and on macro equity hedges (2018 – losses of \$9.0 billion).

The \$1.8 billion increase in net investment income before unrealized and realized gains was due to gains of \$0.9 billion on surplus assets mainly from the sale of government bonds (compared with \$0.2 billion losses in 2018) and \$0.4 billion higher interest income primarily from increased income on debt securities.

Net realized and unrealized gains on assets supporting insurance and investment contract liabilities and on the macro hedge program was a gain of \$18.2 billion for full year 2019 compared with a loss of \$9.0 billion for full year 2018. The full year 2019 gain largely resulted from interest rate decreases in both North America and Asia. The 10-year government bonds for the U.S., Canada, and Hong Kong decreased 77 bps, 27 bps, and 24 bps, respectively. Additional gains were driven by positive equity markets performance as all major indices were up during the year. The S&P 500 increased 28.9% and S&P/TSX 19.1%.

Fair value accounting policies affect the measurement of both our assets and our liabilities. Refer to “Financial Performance” above.

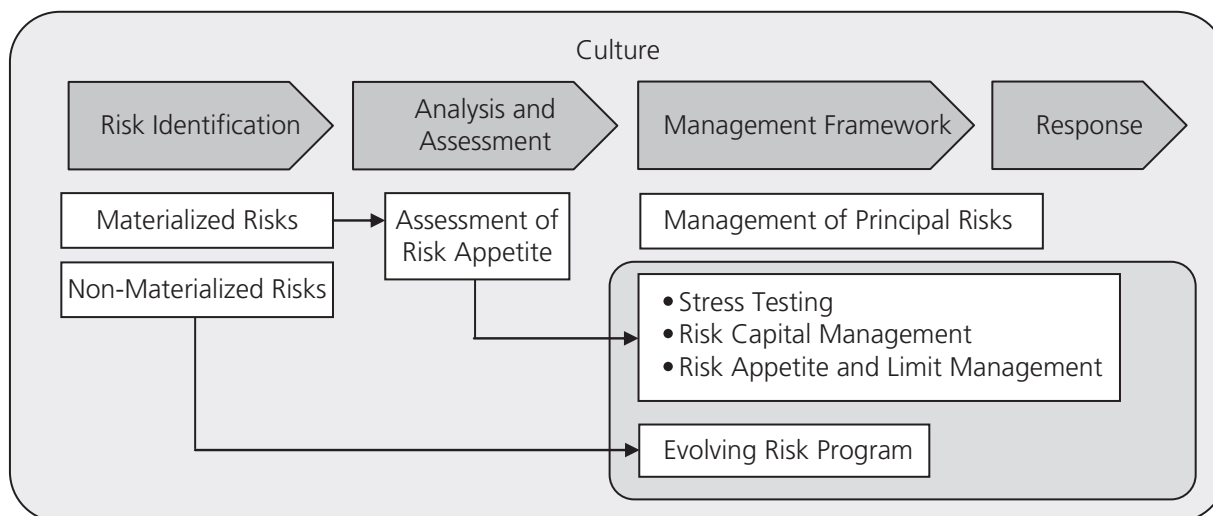
8. Risk Management

This section provides an overview of our overall risk management approach and more specific strategies for our principal risks. A more detailed description of specific risks which may affect our results of operations or financial condition may be found in the “Risk Factors” section below.

a. Enterprise Risk Management Framework

Delivering on our mission “Decisions made easier. Lives made better”, our ambition is to transform into the most digital, customer-centric global company in our industry, while delighting our customers, engaging our employees, and delivering superior returns for our shareholders. The activities required to achieve these results involve elements of risk taking.

Our approach to risk management is governed by our Enterprise Risk Management (“ERM”) Framework.



Our ERM Framework provides a structured approach to risk taking and risk management activities across the enterprise, supporting our long-term revenue, earnings and capital growth strategy. It is communicated through risk policies and standards, which are intended to enable consistent design and execution of strategies across the organization. We have a common approach to managing all risks to which we are exposed, and to evaluating potential directly comparable risk-adjusted returns on contemplated business activities. Our risk policies and standards cover:

- **Risk roles and authorities** – Assignment of accountability and delegation of authority for risk oversight and risk management at various levels within the Company, as well as accountability principles;
- **Governance and strategy** – The types and levels of risk the Company seeks given its strategic plan, the internal and external environment, and risk appetite which drives risk limits and policies;
- **Execution** – Risk identification, measurement, assessment and mitigation which enable those accountable for risks to manage and monitor their risk profile; and
- **Evaluation** – Validation, back testing and independent oversight to confirm that the Company generated the risk profile it intended, root cause analysis of any notable variation, and any action required to re-establish desired levels when exposures materially increase to bring exposures back to desired levels and achieve higher levels of operational excellence.

Our risk management practices are influenced and impacted by external and internal factors (such as economic conditions, political environments, technology and risk culture), which can significantly impact the levels and types of risks we might face in pursuit of strategically optimized risk taking and risk management. Our ERM Framework incorporates relevant impacts and mitigating actions as appropriate.

Three Lines of Defense Model

A strong risk culture and a common approach to risk management are integral to Manulife’s risk management practices. Management is responsible for managing risk within risk appetite and has established risk management strategies and monitoring practices. Our approach to risk management includes a “three lines of defense” governance model that segregates duties among risk taking activities, risk monitoring and risk oversight, and establishes appropriate accountability for those who assume risk versus those who oversee risk.

Our first line of defense includes the Chief Executive Officer (“CEO”), Segment and Business Unit General Managers and Global Function Heads. In our matrix reporting model, the Segment General Managers are ultimately accountable for their business results, the risks they assume to achieve those results, and for the day-to-day management of the risks and related controls, and the Global Function Heads are accountable for the management of the risks and related controls for their function.

The second line of defense is comprised of the Company's Chief Risk Officer ("CRO"), the Global Risk Management ("GRM") function, the Company's Chief Compliance Officer and the Global Compliance Office, and other global oversight functions. Collectively, this group provides independent oversight of risk taking and risk management activities across the enterprise. Risk oversight committees, through broad-based membership, also provide oversight of risk taking and risk management activities.

The third line of defense is Audit Services, which provides independent, objective assurance that controls are effective and appropriate relative to the risk inherent in the business and that risk mitigation programs and risk oversight functions are effective in managing risks.

b. Culture

To enable the achievement of our mission and strategic priorities, we are committed to a set of shared values, which reflect our culture, inform our behaviours, and help define how we work together:

- Obsess about customers – Predict their needs and do everything in our power to satisfy them.
- Do the right thing – Act with integrity and do what we say.
- Think big – Anything is possible. We can always find a better way.
- Get it done together – We're surrounded by an amazing team. Do it better by working together.
- Own it – Feel empowered to make decisions and take action to deliver our mission.
- Share your humanity – Build a supportive, diverse and thriving workplace.

Risk Culture Vision – Within this context, we strive for a risk aware culture, where individuals and groups are encouraged, feel comfortable and are proactive in making transparent, balanced risk-return decisions that are in the long-term interests of the Company.

Risk Culture Framework – We have set a framework of desired behaviours to foster a strong risk aware culture. The framework is assessed against a set of qualitative and quantitative indicators and regularly reported to the Board and executive leadership, with the intent to continuously identify opportunities to increase risk awareness across all geographies, businesses and layers of management and staff.

We believe that risk culture is strengthened once desired organizational behaviours and attitudes are reinforced through effective application of our corporate values. As such, we communicate key elements of our values through a risk lens to build a strong risk aware culture, including:

- **Transparency** – Encourage an environment where we can get it done together by openly discussing the strengths, weaknesses and potential range of outcomes of an issue, proposal or initiative and making informed decisions. Escalate issues before they become significant problems.
- **Risk appetite** – Once we have assessed a risk or situation, establish a risk appetite and own that decision. Establish appropriate limits and associated delegated authority so we can confidently execute our strategy within our risk appetite.
- **Learn** – Use mistakes and failures as learning moments and share what was learned; think big by sharing beyond teams and business units. Seek out lessons learned from throughout the organization in order to continuously improve and grow our business the right way.
- **Incentives** – Align personal incentives with our goals and how we want to execute our plan. When things go wrong, share our humanity by planning our reaction and maintaining a supportive environment to ensure appropriate incentives for continued transparency and lessons learned.

c. Risk Governance

The Board of Directors oversees our culture of integrity and ethics, strategic planning, risk management, and corporate governance, among other things. The Board of Directors carries out its responsibilities directly and through its four standing committees:

- **Risk Committee** – Oversees the management of our principal risks, and our programs, policies and procedures to manage those risks.
- **Audit Committee** – Oversees internal control over financial reporting and our finance, actuarial, internal audit and global compliance functions, serves as the conduct review committee, reviews our compliance with legal and regulatory requirements and oversees the performance, qualifications and independence of our external auditors.
- **Management Resources and Compensation Committee** – Oversees our global human resources strategy, policies, programs, management succession, executive compensation, and pension plan governance.
- **Corporate Governance and Nominating Committee** – Develops our governance policies, practices and procedures, among other things.

The CEO is directly accountable to the Board of Directors for our results and operations and all risk taking activities and risk management practices required to achieve those results. The CEO is supported by the CRO as well as by the Executive Risk Committee ("ERC"). Together, they shape and promote our risk culture, guide risk taking throughout our global operations and strategically manage our overall risk profile. The ERC, along with other executive-level risk oversight committees, establishes risk policies, guides risk taking activity, monitors significant risk exposures and sponsors strategic risk management priorities throughout the organization.

Global Risk Management, under the direction of the CRO, establishes and maintains our ERM Framework and oversees the execution of individual risk management programs across the enterprise. Global Risk Management seeks to ensure a consistent enterprise-wide assessment of risk, risk based capital and risk-adjusted returns across all operations.

The ERC approves and oversees the execution of the Company's enterprise risk management program. It establishes and presents for approval to the Board of Directors the Company's risk appetite and enterprise-wide risk limits and monitors our overall risk profile, including key and emerging risks and risk management activities. As part of these activities, the ERC monitors material risk exposures, endorses and reviews strategic risk management priorities, and reviews and assesses the impact of business strategies, opportunities and initiatives on our overall risk position. The ERC is supported by a number of oversight sub-committees including:

- **Credit Committee** – Establishes credit risk policies and risk management standards of practice and oversees the credit risk management program. Also monitors the Company's overall credit risk profile and approves large individual credits and investments.
- **Product Oversight Committee** – Oversees insurance risk and reviews risks in new product and new business reinsurance initiatives. Also monitors product design, new product pricing, and insurance risk exposures and trends.
- **Global Asset Liability Committee** – Oversees market and liquidity risk for insurance products, hedging, and asset liability management programs and strategies. Also monitors market risk profile, risk exposures, risk mitigation activities and compliance with related policies.
- **Operational Risk Committee** – Oversees operational risk appetite, exposures and associated governance, risk processes, risk management activities and compliance with related policies.

We also have segment risk committees, each with mandates similar to the ERC except with a focus at the segment as applicable.

d. Risk Appetite

The Company's strategic direction drives overall risk appetite. All risk taking activities are managed within the Company's overall risk appetite, which defines the amount and types of risks the Company is willing to assume in pursuit of its objectives. It is comprised of three components: overall risk taking philosophy, risk appetite statements, and risk limits and tolerances.

Risk Philosophy – Manulife is a global financial institution offering insurance, wealth and asset management products and other financial services. As we work each day to deliver on our mission "Decisions made easier. Lives made better", our ambition is to transform into the most digital, customer-centric global company in our industry, while delighting our customers, engaging our employees, and delivering superior returns for our shareholders.

The activities required to achieve these results are guided by our values and involve elements of risk taking. As such, when making decisions about risk taking and risk management, the Company places a priority on the following risk management objectives:

- Safeguarding the commitments and expectations established with our customers, creditors, shareholders and employees;
- Supporting the successful design and delivery of customer solutions;
- Prudently and effectively deploying the capital invested in the Company by shareholders with appropriate risk/return profiles;
- To invest wealth and asset management's customer assets consistent with their objectives, including investment risks and returns;
- Protecting and/or enhancing the Company's reputation and brand; and
- To maintain the Company's targeted financial strength rating.

We aim to only accept risks we can appropriately analyze and monitor. Risk management is an important factor in determining the success of our Company by providing a framework to mitigate exposures within the risk appetite and effectively deploying our capital towards appropriate risk/return profiles. As an integrated component of our business model, risk management assists the Company in achieving our objectives and encourages organizational learning.

Risk Appetite Statements – At least annually, we establish and/or reaffirm that our risk appetite and the Company's strategy are aligned. The risk appetite statements provide 'guideposts' on our appetite for identified risks, any conditions placed on associated risk taking and direction for where quantitative risk limits should be established. The Company's risk appetite statements are as follows:

- Manulife accepts a total level of risk that provides a very high level of confidence to meeting customer obligations while targeting an appropriate overall return to shareholders over time;
- Manulife values innovation and encourages initiatives intended to advance the Company's ambition to be a digital, customer-centric market leader;
- Capital market risks are acceptable when they are managed within specific risk limits and tolerances;
- The Company believes a diversified investment portfolio reduces overall risk and enhances returns; therefore, it accepts credit and alternative long-duration asset related risks;
- The Company pursues product risks that add customer and shareholder value where there is competence to assess and monitor them, and for which appropriate compensation is received;
- Manulife accepts that operational risks are an inherent part of the business when managed within thresholds and tolerances of key risk indicators and will protect its business and customers' assets through cost-effective operational risk mitigation; and
- Manulife expects its officers and employees to act in accordance with the Company's values, ethics and standards; and to protect its brand and reputation.

Risk Limits and Tolerances – Risk limits and tolerances are established for risks within our risk classification framework that are inherent in our strategies in order to define the types and amount of risk the Company will assume. Risk tolerance levels are set for risks deemed to be most significant to the Company and are established in relation to economic capital, earnings-at-risk and regulatory capital required. The purpose of risk limits is to cascade the total Company risk appetite to a level that can be effectively managed. Manulife establishes standalone risk limits for risk categories to avoid excessive concentration in any individual risk category and to manage the overall risk profile of the organization.

e. Risk Identification, Measurement and Assessment

We have a common approach and process to identify, measure, and assess the risks we assume. We evaluate all potential new business initiatives, acquisitions, product offerings, reinsurance arrangements, and investment and financing transactions on a comparable risk-adjusted basis. Segments and functional groups are responsible for identifying and assessing key and emerging risks on an ongoing basis. A standard inventory of risks is used in all aspects of risk identification, measurement and assessment, and monitoring and reporting.

Risk exposures are evaluated using a variety of measures focused on both short-term net income attributed to shareholders and long-term economic value, with certain measures used across all risk categories, while others are applied only to some risks or a single risk type. Measures include stress tests such as sensitivity tests, scenario impact analyses and stochastic scenario modeling. In addition, qualitative risk assessments are performed, including for those risk types that cannot be reliably quantified.

We perform a variety of stress tests on earnings, regulatory capital ratios, economic capital, earnings-at-risk and liquidity that consider significant, but plausible events. We also perform other integrated, complex scenario tests to assess key risks and the interaction of these risks.

Economic capital and earnings-at-risk provide measures of enterprise-wide risk that can be aggregated and compared across business activities and risk types. Economic capital measures the amount of capital required to meet obligations with a high and pre-defined confidence level. Our earnings-at-risk metric measures the potential variance from quarterly expected earnings at a particular confidence level. Economic capital and earnings-at-risk are both determined using internal models.

f. Risk Monitoring and Reporting

Under the direction of the CRO, GRM oversees a formal process for monitoring and reporting on all significant risks at the Company-wide level. Risk exposures are also discussed at various risk oversight committees, along with any exceptions or proposed remedial actions, as required.

On at least a quarterly basis, the ERC and the Board's Risk Committee reviews risk reports that present an overview of our overall risk profile and exposures across our principal risks. The reports incorporate both quantitative risk exposure measures and sensitivities, and qualitative assessments. The reports also highlight key risk management activities and facilitate monitoring compliance with key risk policy limits.

Our Chief Actuary presents the results of the Dynamic Capital Adequacy Test to the Board of Directors annually. Our Chief Auditor reports the results of internal audits of risk controls and risk management programs to the Audit Committee semi-annually. Management reviews the implementation of key risk management strategies, and their effectiveness, with the Board Risk Committee annually.

g. Risk Control and Mitigation

Risk control activities are in place throughout the Company to seek to mitigate risks within established risk limits. We believe our controls, which include policies, procedures, systems and processes, are appropriate and commensurate with the key risks faced at all levels across the Company. Such controls are an integral part of day-to-day activity, business management and decision making.

GRM establishes and oversees formal review and approval processes for product offerings, insurance underwriting, reinsurance, investment activities and other material business activities, based on the nature, size and complexity of the risk taking activity involved. Authorities for assuming risk at the transaction level are delegated to specific individuals based on their skill, knowledge and experience.

h. Emerging Risks

The identification and assessment of our external environment for emerging risks is an important aspect of our ERM Framework, as these risks, although yet to materialize, could have the potential to have a material adverse impact on our operations and/or business strategies. We also consider taking advantage of opportunities identified to improve our competitiveness and ultimately our financial results.

Our Emerging Risk Framework facilitates the ongoing identification, assessment and monitoring of emerging risks, and includes: maintaining a process that facilitates the ongoing discussion and evaluation of potential emerging risks with senior business and functional management; reviewing and validating emerging risks with the ERC; creating and executing on responses to each emerging risk based on prioritization; and monitoring and reporting on emerging risks on a regular basis to the Board's Risk Committee.

Regulatory Capital

OSFI's LICAT capital regime applies to our business globally on a group consolidated basis. We continue to meet OSFI's capital requirements and maintain capital in excess of regulatory capital expectations. No material changes in LICAT rules are anticipated for 2020 and 2021 as OSFI is focusing its efforts on assessing potential changes to the regulatory framework to align with the IFRS 17 accounting changes expected in 2022, at the earliest.

At its annual meeting in November 2019, the International Association of Insurance Supervisors ("IAIS") adopted a risk based global Insurance Capital Standard ("ICS"), that will be further developed over a five-year monitoring period beginning in 2020. While broadly supportive of the goals of ICS, OSFI stated that it did not support the ICS design for the monitoring period, citing that it was 'not fit

for purpose for the Canadian market'. Without the OSFI consent, the IASB rules will not apply in Canada or to Canadian companies on a group-wide basis although some regulators may use the ICS framework for calculating capital in their specific markets. As the ICS methodology and its applicability will be evolving, we will be monitoring the developments.

The IASB has also been developing a holistic framework to assess and mitigate insurance sector systemic risk, which includes reviewing the activities of insurers. It is not yet known how these proposals will affect capital or other regulatory requirements and Manulife's competitive position given that several key items of the framework remain under discussion.

Regulators in various jurisdictions in which we operate have embarked on reforming their respective capital regulations. The impact of these changes remains uncertain and we have been actively involved in industry discussions.

IFRS 17 and IFRS 9

IFRS 17 and IFRS 9 are expected to be effective for insurance companies in 2022 and potentially delayed until 2023. The final date is expected to be issued by the IASB in mid-2020.

IFRS 17 will replace IFRS 4 "Insurance Contracts" and will materially change the timing of the recognition of earnings and therefore equity. Furthermore, the requirements of the new standard are complex and will necessitate significant enhancements to finance infrastructure and processes and could impact business strategy. IFRS 9 will impact the measurement and timing of investment income.

Risks related to the new standards include:

- **The impact on regulatory capital.** In addition to the impact on timing of recognition of earnings and equity, the regulatory capital framework in Canada is currently aligned with IFRS. OSFI has stated that it intends to maintain capital frameworks consistent with current capital policies and to minimize potential industry-wide capital impacts. To achieve this outcome, we anticipate that OSFI will amend LICAT guidelines for IFRS 17 and is in the process of consulting directly with affected stakeholders.
- **The impact on our business strategy as a result of temporary volatility.** The treatment of the discount rate and new business gains under IFRS 17 could create material temporary volatility in our financial results and depending on the LICAT treatment, on our capital position. The Company's capital position and income for accounting purposes could be significantly influenced by prevailing market conditions, resulting in volatility of reported results, which may require changes to business strategies and the introduction of new non-GAAP measures to explain our results. The impact to business strategy could include changes to hedging and investment strategy, product strategy and the use of reinsurance and, as a result, could impact our exposures to other risks such as counterparty risk and liquidity risk.
- **The impact on tax.** In certain jurisdictions, including Canada, the implementation of IFRS 17 could have a material effect on tax positions and other financial metrics that are dependent upon IFRS accounting values.
- **The impact on operational readiness.** The adoption of IFRS 17 poses significant operational challenges for the insurance industry as there is yet to be a complete commercially viable system solution. The standard introduces complex estimation techniques, computational requirements and disclosures which necessitate a major transformation to the Company's systems along with actuarial and financial reporting processes. Once a system solution is available, significant efforts are required from insurers to integrate it into their financial reporting environment, perform impact studies, and educate and socialize the potential impacts with stakeholders. These risks are increased by the fact that the revised Standard is not expected to be issued until mid-2020, just six months prior to the start of the potential comparative period and transition date.
- **The impact of inconsistencies in timing of adoption between various jurisdictions.** Based on responses to the IASB's exposure draft, the European Financial Reporting Group is recommending an effective date of January 1, 2023. Unlike our international peers, Canadian insurers are required to file in accordance with IFRS as issued by the IASB and therefore could be one of the first jurisdictions to adopt the standard if the date remains January 1, 2022. The difference in adoption dates could result in risk of interpretations and application issues being dealt with under inconsistent timelines, increasing the risk of jurisdictional reporting differences and post adoption changes for the first movers.

As a global insurer with subsidiaries in Asia, different effective dates will require us to maintain more than one set of books to support consolidated financial statements and for local entity reporting. Although early adoption is permitted, our local entities would be required to choose between alignment with the consolidated financial statements of the Canadian parent or comparability with local competitors, in order to avoid maintaining two sets of books.

The CLHIA as well as Manulife and other Canadian and international insurers responded to the IASB's 2019 exposure draft and highlighted the risk related to key jurisdictions adopting IFRS 17 on different timelines. Adopting the standard in Canada before it is adopted by Europe and the UK has the potential for changes to interpretation of IFRS 17 during or subsequent to our adoption. This could result in significant revisions to our actuarial and accounting policies and estimates and changes to our systems.

Our extensive enterprise-wide implementation program incorporates resources to implement appropriate changes to policies and processes, education to internal and external stakeholders, sourcing appropriate data and deploying system solutions. Our governance model and close contact with industry working groups helps to manage the risks noted above.

i. General Macro-Economic Risk Factors

The global macro-economic environment has a significant impact on our financial plans and ability to implement our business strategy. The macro-economic environment can be significantly impacted by the actions of both the government sector (including central banks) and the private sector. The macro-economic environment may also be affected by natural and human-made catastrophes.

Our business strategy and associated financial plans are developed by considering forecasts of economic growth, both globally and in the specific countries we operate. Actual economic growth can be significantly impacted by the macro-economic environment and can deviate significantly from forecast, thus impacting our financial results and the ability to implement our business strategy.

Changes in the macro-economic environment can also have a significant impact on financial markets, including movements in interest rates, spreads on fixed income assets and returns on public equity and ALDA assets. Our financial plan, including income projections, capital projections, and valuation of liabilities are based on certain assumptions with respect to future movements in interest rates and spreads on fixed income assets, and expected future returns from our public equity and ALDA investments. Actual experience is highly variable and can deviate significantly from our assumptions, thus impacting our financial results. In addition, actual experience that is significantly different from our assumptions and/or changes in the macro-economic environment may result in changes to the assumptions themselves which would also impact our financial results.

Specific changes in the macro-economic environment can have very different impacts across different parts of the business. For example, a rise in interest rates is generally beneficial to us in the long-term but can adversely affect valuations of some ALDA assets, especially those that have returns dependent on contractual cash flows, such as real estate.

The spending and savings patterns of our customers could be significantly influenced by the macro-economic environment and could have an impact on the products and services we offer to our customers.

Customer behaviour and emergence of claims on our liabilities can be significantly impacted by the macro-economic environment. For example, a prolonged period of economic weakness could impact the health and well-being of our customers and that could result in increased claims for certain insurance risks.

The following sections describe the risk management strategies for each of our five principal risk categories: strategic risk, market risk, credit risk, product risk and operational risk.

j. Strategic Risk

Strategic risk is the risk of loss resulting from the inability to adequately plan or implement an appropriate business strategy, or to adapt to change in the external business, political or regulatory environment.

Risk Management Strategy

The CEO and Executive Leadership Team establish and oversee execution of business strategies and have accountability to identify and manage the risks embedded in these strategies. They are supported by a number of processes:

- Strategic business, risk and capital planning that is reviewed with the Board of Directors, Executive Leadership Team, and the ERC;
- Performance and risk reviews of all key businesses with the CEO and annual reviews with the Board of Directors;
- Risk based capital attribution and allocation designed to encourage a consistent decision-making framework across the organization; and
- Review and approval of significant acquisitions and divestitures by the CEO and, where appropriate, the Board of Directors.

Reputation risk is the risk that the Company's corporate image may be eroded by adverse publicity, about real or perceived issues, as a result of business practices of Manulife or its representatives potentially causing long-term or even irreparable damage to the Company's franchise value. Reputation risk arises from both internal and external environmental factors, and cannot be managed in isolation from other risks, but only as an integral part of the Company's integrated risk management approach.

The CEO and Executive Leadership Team are ultimately responsible for our reputation; however, our employees and representatives are responsible for conducting their business activities in a manner that upholds our reputation. This responsibility is executed through an enterprise-wide reputation risk policy that specifies the oversight responsibilities of the Board of Directors and the responsibilities of executive management, communication to and education of all directors, officers, employees and representatives, including our Code of Business Conduct and Ethics, and application of guiding principles in conducting all our business activities.

Environmental, Social and Governance Risks

Environmental, social and governance ("ESG") risks may impact our investments, underwriting, or operations, and may create financial, operational, legal, reputational, or brand value risks for Manulife.

In 2019, oversight of Manulife's ESG framework was added to the mandate of the Board's Corporate Governance and Nominating Committee. Manulife's Executive Sustainability Council, which consists of members of the Executive Leadership Team, is responsible for integrating sustainability into Manulife's business and for performance on ESG metrics. It meets at least quarterly and provides quarterly updates to the Corporate Governance and Nominating Committee. The Council is supported by a Sustainability Centre of Expertise consisting of professionals from multiple businesses and functional areas.

Please refer to our "2018 Sustainability Report and Public Accountability Statement" for information on our ESG priorities and performance.

Environment

Manulife supports the recommendations of the Financial Stability Board's Taskforce on Climate-Related Financial Disclosures ("TCFD").

Governance

The Environment pillar – including matters related to climate change – is a component of Manulife's ESG framework, overseen by the Corporate Governance and Nominating Committee. Climate-related risks and opportunities are also considered by the Board's Risk Committee through the ongoing monitoring and reporting of emerging risks.

In 2019, the Executive Sustainability Council initiated a review of Manulife's ESG framework, which included assessing the definitions of climate-related metrics and targets. Progress on ESG-related matters, including climate-related matters, is reported to the Corporate Governance and Nominating Committee at least quarterly.

The Chief Risk Officer, a member of the Executive Sustainability Council, chairs the Climate Change Working Group and is responsible for overseeing the approach and risk management activities, on climate-related matters.

Risk Management

Our definition of climate-related risk is aligned with the TCFD definition and is the risk of loss and/or reputational damage resulting from the inability to adequately plan for the impacts of climate change or the transition to a lower-carbon economy through mechanisms, such as industry regulations, government interventions, and shifts in consumer preferences. We view climate-related risk as a type of strategic risk, since climate change impacts can manifest themselves through any of our existing principal risks.

In 2019, Global Risk Management initiated the review of key policies and standards to enhance the integration of climate-related risk taking activities into the ERM framework to ensure that they are managed in a manner consistent with our common approach to risk management (refer to section "e – Risk Identification, Measurement and Assessment" above). This review included procedures, protocols and due diligence standards of business and functional units that invest and manage real assets, such as Manulife Investment Management's ("MIM") real estate arm, NAL Resources, and Hancock Natural Resource Group.

Some examples of our climate-related risk management activities include monitoring industry and regulatory developments and engaging with investee companies to encourage better disclosures. For example, MIM's public markets team engages some of the world's largest emitters on climate-related risks and opportunities as part of the collaborative industry program Climate Action 100+.

Strategy

Manulife is a long-term oriented underwriter and investor. Therefore, long-term climate-related risks and opportunities, including changes in the physical environment and policy and technological changes associated with the transition to a lower-carbon economy, are strategically relevant.

In 2019, Manulife initiated the climate-related risk identification process across businesses, geographies, and time horizons. For example, we identified the need and defined the plan to systematically analyze the impact of climate change on our mortality and morbidity assumptions. Actuarial impacts of climate change are not yet sufficiently researched in the insurance industry, yet vector-borne diseases, extreme weather, and altered food systems could impact morbidity and/or mortality assumptions of life insurance companies over the long-term.

The Property and Casualty Reinsurance business is a smaller part of our underwriting portfolio, and it may experience business risks associated with the increased frequency and severity of catastrophic weather events. This reinsurance business is subject to annual repricing which acts as a mitigant to this risk over the medium and long-term.

Manulife performed a series of climate change simulations to gain insight into the impact of climate-related risks on investment portfolios. The review included utilizing the Dutch Central Bank's macroeconomic scenarios to inform considerations in investment decision making and capital management. Following MIM's identification of climate change as a business risk, MIM tested a climate scenario risk tool jointly with industry peers convened by the United Nations' Environment Programme – Finance Initiative.

Finally, Manulife sees a business opportunity in enabling clients to invest in decarbonization. We invest general fund assets and third-party client funds in renewable energy, green buildings, and sustainably-managed forestry, and offer diversified investment funds that offer exposure to low-carbon opportunities.

Information gathering and analysis is underway to establish the impact of identified climate-related risks and opportunities on our businesses and inform our strategic approach.

Metrics

Since 2010, Manulife has reported its greenhouse gas emissions to CDP (formerly the Carbon Disclosure Project). Manulife reports direct emissions (scope 1) from assets with operational control, namely real estate operations, NAL Resources and Hancock Natural Resource Group; indirect emissions from purchased or acquired fuel sources (scope 2); and emissions from business travel, cloud services, and landfill waste (scope 3). Emissions are calculated according to the accounting standard Greenhouse Gas Protocol. Since 2017, a third-party has been engaged to conduct an annual limited assurance procedure of our emissions calculation.

As part of our update of our ESG framework, work is underway to assess other relevant climate risk-related metrics and targets.

k. Market Risk

Market risk is the risk of loss resulting from market price volatility, interest rate change, credit and swap spread changes, and adverse foreign currency rate movements. Market price volatility primarily relates to changes in prices of publicly traded equities and alternative long-duration assets. Liquidity risk, which we manage as a form of market risk, is the risk of not having access to sufficient funds or liquid assets to meet both expected and unexpected cash outflows and collateral demands.

IFRS 7 Disclosures

The shaded text and tables in this section and the following section (“Market Risk Sensitivities and Market Risk Exposure Measures”) of this MD&A represent our disclosure on market and liquidity risk in accordance with IFRS 7, “Financial Instruments – Disclosures”, and include a discussion on how we measure risk and our objectives, policies and methodologies for managing these risks. Therefore, the following shaded text and tables represent an integral part of our audited annual Consolidated Financial Statements for the years ended December 31, 2019 and December 31, 2018. The fact that certain text and tables are considered an integral part of the Consolidated Financial Statements does not imply that the disclosures are of any greater importance than the sections not part of the disclosure. Accordingly, the “Risk Management” disclosure should be read in its entirety.

Market Risk Management Strategy

Market risk management strategy is governed by the Global Asset Liability Committee which oversees the overall market and liquidity risk program. Our overall strategy to manage our market risks incorporates several component strategies, each targeted to manage one or more of the market risks arising from our businesses. At an enterprise level, these strategies are designed to manage our aggregate exposures to market risks against limits associated with earnings and capital volatility.

The following table outlines our key market risks and identifies the risk management strategies which contribute to managing these risks.

Risk Management Strategy

	Key Market Risk				
	Publicly Traded Equity Performance Risk	Interest Rate and Spread Risk	Alternative Long-Duration Asset Performance Risk	Foreign Exchange Risk	Liquidity Risk
Product design and pricing	✓	✓	✓	✓	✓
Variable annuity guarantee dynamic hedging	✓	✓		✓	✓
Macro equity risk hedging	✓			✓	✓
Asset liability management	✓	✓	✓	✓	✓
Foreign exchange management				✓	✓
Liquidity risk management					✓

Publicly Traded Equity Performance Risk – To manage publicly traded equity performance risk from our insurance and annuity businesses, we primarily use a variable annuity guarantee dynamic hedging strategy which is complemented by a general macro equity risk hedging strategy, in addition to asset liability management strategies. Our strategies employed for variable annuity guarantee dynamic hedging and macro equity risk hedging expose the Company to additional risks. See “Risk Factors” below.

Interest Rate and Spread Risk – To manage interest rate risk, we primarily employ asset liability management strategies to manage the duration of our fixed income investments in our insurance segments and our Corporate and Other segment by executing interest rate hedges.

ALDA Performance Risk – We seek to limit concentration risk associated with ALDA performance by investing in a diversified basket of assets including commercial real estate, timber, farmland, private equities, infrastructure, and oil and gas assets. We further diversify risk by managing investments against established investment and risk limits.

Foreign Exchange Risk – Our policy is to generally match the currency of our assets with the currency of the liabilities they support. Where assets and liabilities are not currency matched, we seek to hedge this exposure where appropriate to stabilize our capital positions and remain within our enterprise foreign exchange risk limits through the use of financial instruments such as derivatives.

Liquidity Risk – Our liquidity risk management framework is designed to provide adequate liquidity to cover cash and collateral obligations as they come due, and to sustain and grow operations in both normal and stressed conditions. Refer to “Liquidity Risk Management Strategy” below for more information.

Product Design and Pricing Strategy

Our policies, standards, and guidelines with respect to product design and pricing are designed with the objective of aligning our product offerings with our risk taking philosophy and risk appetite, and in particular, that incremental risk generated from new sales aligns with our strategic risk objectives and risk limits. The specific design features of our product offerings, including level of benefit guarantees, policyholder options, fund offerings and availability restrictions as well as our associated investment strategies, help to mitigate the level of underlying risk. We regularly review and modify key features within our product offerings, including premiums and fee charges with a goal of meeting profit targets and staying within risk limits. Certain of our general fund adjustable benefit products have minimum rate guarantees. The rate guarantees for any particular policy are set at the time the policy is issued and governed by insurance regulation in each jurisdiction where the products are sold. The contractual provisions allow crediting rates to be re-set at pre-established intervals subject to the established minimum crediting rate guarantees. The Company may partially mitigate the interest rate exposure by setting new rates on new business and by adjusting rates on in-force business where permitted. In addition, the Company partially mitigates this interest rate risk through its asset liability management process, product design elements, and crediting rate strategies. New product initiatives, new reinsurance arrangements and material insurance underwriting initiatives must be reviewed and approved by the CRO or key individuals within risk management functions.

Hedging Strategies for Variable Annuity and Other Equity Risks

The Company's exposure to movement in public equity market values primarily arises from insurance liabilities related to variable annuity guarantees and general account public equity investments.

Dynamic hedging is the primary hedging strategy for variable annuity market risks. Dynamic hedging is employed for new variable annuity guarantees business when written or as soon as practical thereafter.

We seek to manage public equity risk arising from unhedged exposures in our insurance liabilities through our macro equity risk hedging strategy. We seek to manage interest rate risk arising from variable annuity business not dynamically hedged within our asset liability management strategy.

Variable Annuity Dynamic Hedging Strategy

The variable annuity dynamic hedging strategy is designed to hedge the sensitivity of variable annuity guarantee policy liabilities and available capital to fund performance (both public equity and bond funds) and interest rate movements. The objective of the variable annuity dynamic hedging strategy is to offset, as closely as possible, the change in the economic value of guarantees with the profit and loss from our hedge asset portfolio. The economic value of guarantees moves in close tandem, but not exactly, with our variable annuity guarantee policy liabilities, as it reflects best estimate liabilities and does not include any liability provisions for adverse deviations.

Our variable annuity hedging program uses a variety of exchange-traded and over-the-counter (OTC) derivative contracts to offset the change in value of variable annuity guarantees. The main derivative instruments used are equity index futures, government bond futures, currency futures, interest rate swaps, total return swaps, equity options and interest rate swaptions. The hedge instruments' positions against policy liabilities are continuously monitored as market conditions change. As necessary, the hedge asset positions will be dynamically rebalanced in order to stay within established limits. We may also utilize other derivatives with the objective to improve hedge effectiveness opportunistically.

Our variable annuity guarantee dynamic hedging strategy is not designed to completely offset the sensitivity of policy liabilities to all risks associated with the guarantees embedded in these products. The profit (loss) on the hedge instruments will not completely offset the underlying losses (gains) related to the guarantee liabilities hedged because:

- Policyholder behaviour and mortality experience are not hedged;
- Provisions for adverse deviation in the policy liabilities are not hedged;
- A portion of interest rate risk is not hedged;
- Credit spreads may widen and actions might not be taken to adjust accordingly;
- Fund performance on a small portion of the underlying funds is not hedged due to lack of availability of effective exchange-traded hedge instruments;
- Performance of the underlying funds hedged may differ from the performance of the corresponding hedge instruments;
- Correlations between interest rates and equity markets could lead to unfavourable material impacts;
- Unfavourable hedge rebalancing costs can be incurred during periods of high volatility from equity markets, bond markets and/or interest rates. The impact is magnified when these impacts occur concurrently; and
- Not all other risks are hedged.

Macro Equity Risk Hedging Strategy

The objective of the macro equity risk hedging program is to maintain our overall earnings sensitivity to public equity market movements within our Board approved risk appetite limits. The macro equity risk hedging program is designed to hedge earnings sensitivity due to movements in public equity markets arising from all sources (outside of dynamically hedged exposures). Sources of equity market sensitivity addressed by the macro equity risk hedging program include:

- Residual equity and currency exposure from variable annuity guarantees not dynamically hedged;
- General fund equity holdings backing non-participating liabilities; and
- Unhedged provisions for adverse deviation related to variable annuity guarantees dynamically hedged.

Asset Liability Management Strategy

Our asset liability management strategy is designed to help ensure that the market risks embedded in our assets and liabilities held in the Company's general fund are effectively managed and that risk exposures arising from these assets and liabilities are maintained within risk limits. The embedded market risks include risks related to the level and movement of interest rates and credit and swap spreads, public equity market performance, ALDA performance and foreign exchange rate movements.

General fund product liabilities are categorized into groups with similar characteristics in order to support them with a specific asset strategy. We seek to align the asset strategy for each group to the premium and benefit pattern, policyholder options and guarantees, and crediting rate strategies of the products they support. Similar strategies are established for assets in the Company's surplus account. The strategies are set using portfolio analysis techniques intended to optimize returns, subject to considerations related to regulatory and economic capital requirements, and risk tolerances. They are designed to achieve broad diversification across asset classes and individual investment risks while being suitably aligned with the liabilities they support. The strategies encompass asset mix, quality rating, term profile, liquidity, currency and industry concentration targets.

Products which feature guaranteed liability cash flows (i.e. where the projected net flows are not materially dependent upon economic scenarios) are managed to a target return investment strategy. The products backed by this asset group include:

- Accumulation annuities (other than annuities with pass-through features), which are primarily short-to-medium-term obligations and offer interest rate guarantees for specified terms on single premiums. Withdrawals may or may not have market value adjustments;
- Payout annuities, which have no surrender options and include predictable and very long-dated obligations; and
- Insurance products, with recurring premiums extending many years in the future, and which also include a significant component of very long-dated obligations.

We seek to manage the assets backing these long-dated benefits to achieve a target return sufficient to support the obligations over their lifetime, subject to established risk tolerances, by investing in a basket of diversified alternative long-duration assets, which may include public equity investments ("ALDA and public equity"), with the balance invested in fixed income. Utilizing ALDA and public equity investments provides a suitable match for long-duration liabilities that also enhances long-term investment returns and reduces aggregate risk through diversification.

Fixed income assets are managed to a benchmark developed to minimize interest rate risk against the liability cash flows not supported by ALDA and public equity investments, and to achieve target returns/spreads required to preserve long-term interest rate investment assumptions used in liability pricing.

For insurance and annuity products where significant pass-through features exist, a total return strategy approach is used, generally combining fixed income with ALDA plus public equity investments. ALDA and public equity may be included to enhance long-term investment returns and reduce aggregate risk through diversification. Target investment strategies are established using portfolio analysis techniques that seek to optimize long-term investment returns while considering the risks related to embedded product guarantees and policyholder withdrawal options, the impact of regulatory and economic capital requirements and management tolerances with respect to short-term income volatility and long-term tail risk exposure. For these pass-through products such as participating insurance and universal life insurance, the investment performance of assets supporting the liabilities will be largely passed through to policyholders as changes in the amounts of dividends declared or rates of interest credited, subject to embedded minimum guarantees. Shorter duration liabilities such as fixed deferred annuities do not incorporate ALDA plus public equity into their target asset mixes. Authority to manage our investment portfolios is delegated to investment professionals who manage to benchmarks derived from the target investment strategies established for each group, including interest rate risk tolerances.

Our asset liability management strategy incorporates a wide variety of risk measurement, risk mitigation and risk management, and hedging processes. The liabilities and risks to which the Company is exposed, however, cannot be completely matched or hedged due to both limitations on instruments available in investment markets and uncertainty of impact on liability cash flows from policyholder experience/behaviour.

Foreign Exchange Risk Management Strategy

Our policy is to generally match the currency of our assets with the currency of the liabilities they support. Where assets and liabilities are not currency matched, we seek to hedge this exposure where appropriate to stabilize our capital positions and remain within our enterprise foreign exchange risk limits through the use of financial instruments such as derivatives.

Risk from small balance sheet mismatches is accepted if managed within set risk limits. Risk exposures are measured in terms of potential changes in capital ratios, due to foreign exchange rate movements, determined to represent a specified likelihood of occurrence based on internal models.

Liquidity Risk Management Strategy

Global liquidity management policies and procedures are designed to provide adequate liquidity to cover cash and collateral obligations as they come due, and to sustain and grow operations in both normal and stressed conditions. They reflect legal, regulatory, tax, operational or economic impediments to inter-entity funding. The asset mix of our balance sheet takes into account the need to hold adequate unencumbered and appropriate liquid assets to satisfy the requirements arising under stressed scenarios and to allow our liquidity ratios to remain strong. We manage liquidity centrally and closely monitor the liquidity positions of our principal subsidiaries.

We seek to mitigate liquidity risk by diversifying our business across different products, markets, geographical regions and policyholders. We design insurance products to encourage policyholders to maintain their policies in-force, to help generate a diversified and stable flow of recurring premium income. We design the policyholder termination features of our wealth management products and related investment strategies with the goal of mitigating the financial exposure and liquidity risk related to unexpected policyholder terminations. We establish and implement investment strategies intended to match the term profile of the assets to the liabilities they support, taking into account the potential for unexpected policyholder terminations and resulting liquidity needs. Liquid assets represent a large portion of our total assets. We aim to reduce liquidity risk in our deposit funded businesses by diversifying our funding sources and appropriately managing the term structure of our funding. We forecast and monitor daily operating liquidity and cash movements in various individual entities and operations as well as centrally, aiming to ensure liquidity is available and cash is employed optimally.

We also maintain centralized cash pools and access to other sources of liquidity and contingent liquidity such as repurchase funding agreements. Our centralized cash pool consists of cash or near-cash, high quality short-term investments that are continually monitored for their credit quality and market liquidity.

We have established a variety of contingent liquidity sources. We maintain a \$500 million committed unsecured revolving credit facility with certain Canadian chartered banks available for MFC, and a US\$500 million committed unsecured revolving credit facility with certain U.S. banks available for MFC and certain of its subsidiaries. There were no outstanding borrowings under these credit facilities as of December 31, 2019. In addition, John Hancock ("JH") USA is a member of the Federal Home Loan Bank of Indianapolis ("FHLBI"), which enables the Company to obtain loans from FHLBI as an alternative source of liquidity that is collateralizable by qualifying mortgage loans, mortgage-backed securities and U.S. Treasury and Agency securities. Based on regulatory limitations, as of December 31, 2019, JHUSA had an estimated maximum borrowing capacity of US\$3.9 billion under the FHLBI facility, with no amounts outstanding.

The following table outlines the maturity of the Company's significant financial liabilities.

Maturity of financial liabilities⁽¹⁾

As at December 31, 2019 (\$ millions)	Less than 1 year	1 to 3 years	3 to 5 years	Over 5 years	Total
Long-term debt	\$ 649	\$ –	\$ –	\$3,894	\$ 4,543
Capital instruments	–	–	598	6,522	7,120
Derivatives	332	145	218	9,589	10,284
Deposits from Bank clients ⁽²⁾	16,872	2,632	1,984	–	21,488
Lease liabilities	107	142	49	76	374

⁽¹⁾ The amounts shown above are net of the related unamortized deferred issue costs.

⁽²⁾ Carrying value and fair value of deposits from Bank clients as at December 31, 2019 was \$21,488 million and \$21,563 million, respectively (2018 – \$19,684 million and \$19,731 million, respectively). Fair value is determined by discounting contractual cash flows, using market interest rates currently offered for deposits with similar terms and conditions. All deposits from Bank clients were categorized in Level 2 of the fair value hierarchy (2018 – Level 2).

Through the normal course of business, pledging of assets is required to comply with jurisdictional regulatory and other requirements including collateral pledged to partially mitigate derivative counterparty credit risk, assets pledged to exchanges as initial margin and assets held as collateral for repurchase funding agreements. Total unencumbered assets were \$455.2 billion as at December 31, 2019 (2018 – \$427.9 billion).

I. Market Risk Sensitivities and Market Risk Exposure Measures

Variable Annuity and Segregated Fund Guarantees Sensitivities and Risk Exposure Measures

Guarantees on variable annuity products and segregated funds may include one or more of death, maturity, income and withdrawal guarantees. Variable annuity and segregated fund guarantees are contingent and only payable upon the occurrence of the relevant event, if fund values at that time are below guaranteed values. Depending on future equity market levels, liabilities on current in-force business would be due primarily in the period from 2020 to 2040.

We seek to mitigate a portion of the risks embedded in our retained (i.e. net of reinsurance) variable annuity and segregated fund guarantee business through the combination of our dynamic and macro hedging strategies (see “Publicly Traded Equity Performance Risk” below).

The table below shows selected information regarding the Company’s variable annuity and segregated fund investment-related guarantees gross and net of reinsurance.

Variable annuity and segregated fund guarantees, net of reinsurance

As at December 31, (\$ millions)	2019			2018		
	Guarantee value	Fund value	Amount at risk ^{(4),(5)}	Guarantee value	Fund value	Amount at risk ^{(4),(5)}
Guaranteed minimum income benefit	\$ 4,629	\$ 3,696	\$ 998	\$ 5,264	\$ 3,675	\$ 1,593
Guaranteed minimum withdrawal benefit	53,355	48,031	6,030	60,494	49,214	11,388
Guaranteed minimum accumulation benefit	17,994	18,362	10	18,611	18,720	141
Gross living benefits ^{(1),(2)}	75,978	70,089	7,038	84,369	71,609	13,122
Gross death benefits ⁽³⁾	9,555	17,186	802	10,663	14,654	1,567
Total gross of reinsurance	85,533	87,275	7,840	95,032	86,263	14,689
Living benefits reinsured	3,977	3,199	832	4,515	3,173	1,343
Death benefits reinsured	718	500	318	2,353	2,070	493
Total reinsured	4,695	3,699	1,150	6,868	5,243	1,836
Total, net of reinsurance	\$ 80,838	\$ 83,576	\$ 6,690	\$ 88,164	\$ 81,020	\$ 12,853

⁽¹⁾ Where a policy includes both living and death benefits, the guarantee in excess of the living benefit is included in the death benefit category as outlined in footnote 3.

⁽²⁾ Contracts with guaranteed long term care benefits are included in this category.

⁽³⁾ Death benefits include standalone guarantees and guarantees in excess of living benefit guarantees where both death and living benefits are provided on a policy.

⁽⁴⁾ Amount at risk (in-the-money amount) is the excess of guarantee values over fund values on all policies where the guarantee value exceeds the fund value. This amount is not currently payable. For guaranteed minimum death benefit, the amount at risk is defined as the current guaranteed minimum death benefit in excess of the current account balance. For guaranteed minimum income benefit, the amount at risk is defined as the excess of the current annuitization income base over the current account value. For all guarantees, the amount at risk is floored at zero at the single contract level.

⁽⁵⁾ The amount at risk net of reinsurance at December 31, 2019 was \$6,690 million (2018 – \$12,853 million) of which: US\$3,995 million (2018 – US\$6,899 million) was on our U.S. business, \$1,178 million (2018 – \$2,654 million) was on our Canadian business, US\$104 million (2018 – US\$332 million) was on our Japan business and US\$145 million (2018 – US\$246 million) was related to Asia (other than Japan) and our run-off reinsurance business.

Investment categories for variable contracts with guarantees

Variable contracts with guarantees, including variable annuities and variable life, are invested, at the policyholder’s discretion subject to contract limitations, in various fund types within the segregated fund accounts and other investments. The account balances by investment category are set out below.

As at December 31, (\$ millions)	2019	2018
Investment category		
Equity funds	\$ 47,489	\$ 44,333
Balanced funds	42,448	41,749
Bond funds	11,967	12,279
Money market funds	1,732	2,109
Other fixed interest rate investments	1,975	2,000
Total	\$ 105,611	\$ 102,470

Caution Related to Sensitivities

In the sections that follow, we provide sensitivities and risk exposure measures for certain risks. These include sensitivities due to specific changes in market prices and interest rate levels projected using internal models as at a specific date and are measured relative to a starting level reflecting the Company's assets and liabilities at that date and the actuarial factors, investment activity and investment returns assumed in the determination of policy liabilities. The risk exposures measure the impact of changing one factor at a time and assume that all other factors remain unchanged. Actual results can differ significantly from these estimates for a variety of reasons including the interaction among these factors when more than one changes; changes in actuarial and investment return and future investment activity assumptions; actual experience differing from the assumptions, changes in business mix, effective tax rates and other market factors; and the general limitations of our internal models. For these reasons, the sensitivities should only be viewed as directional estimates of the underlying sensitivities for the respective factors based on the assumptions outlined below. Given the nature of these calculations, we cannot provide assurance that the actual impact on net income attributed to shareholders or on MLI's LICAT total ratio will be as indicated. Market movements affect LICAT capital sensitivities both through income and other components of the regulatory capital framework. For example, LICAT is affected by changes to other comprehensive income.

Publicly Traded Equity Performance Risk Sensitivities and Exposure Measures

As outlined above, we have net exposure to equity risk through asset and liability mismatches; our variable annuity guarantee dynamic hedging strategy is not designed to completely offset the sensitivity of policy liabilities to all risks associated with the guarantees embedded in these products. The macro hedging strategy is designed to mitigate public equity risk arising from variable annuity guarantees not dynamically hedged and from other unhedged exposures in our insurance liabilities.

Changes in equity prices may impact other items including, but not limited to, asset-based fees earned on assets under management and administration or policyholder account value, and estimated profits and amortization of deferred policy acquisition and other costs. These items are not hedged.

The table below shows the potential impact on net income attributed to shareholders resulting from an immediate 10%, 20% and 30% change in market values of publicly traded equities followed by a return to the expected level of growth assumed in the valuation of policy liabilities. If market values were to remain flat for an entire year, the potential impact would be roughly equivalent to an immediate decline in market values equal to the expected level of annual growth assumed in the valuation of policy liabilities. Further, if after market values dropped 10%, 20% or 30% they continued to decline, remained flat, or grew more slowly than assumed in the valuation the potential impact on net income attributed to shareholders could be considerably more than shown. Refer to "Sensitivity of Earnings to Changes in Assumptions" for more information on the level of growth assumed and on the net income sensitivity to changes in these long-term assumptions. The potential impact is shown after taking into account the impact of the change in markets on the hedge assets. While we cannot reliably estimate the amount of the change in dynamically hedged variable annuity guarantee liabilities that will not be offset by the profit or loss on the dynamic hedge assets, we make certain assumptions for the purposes of estimating the impact on net income attributed to shareholders.

This estimate assumes that the performance of the dynamic hedging program would not completely offset the gain/loss from the dynamically hedged variable annuity guarantee liabilities. It assumes that the hedge assets are based on the actual position at the period end, and that equity hedges in the dynamic program are rebalanced at 5% intervals. In addition, we assume that the macro hedge assets are rebalanced in line with market changes.

It is also important to note that these estimates are illustrative, and that the dynamic and macro hedging programs may underperform these estimates, particularly during periods of high realized volatility and/or periods where both interest rates and equity market movements are unfavourable.

The Standards of Practice for the valuation of insurance contract liabilities and guidance published by the CIA constrain the investment return assumptions for public equities and certain ALDA assets based on historical return benchmarks for public equities. The potential impact on net income attributed to shareholders does not take into account possible changes to investment return assumptions resulting from the impact of declines in public equity market values on these historical return benchmarks.

Potential immediate impact on net income attributed to shareholders arising from changes to public equity returns^{(1),(2),(3)}

As at December 31, 2019 (\$ millions)	-30%	-20%	-10%	+10%	+20%	+30%
Underlying sensitivity to net income attributed to shareholders⁽⁴⁾						
Variable annuity guarantees	\$ (3,270)	\$ (1,930)	\$ (860)	\$ 620	\$ 1,060	\$ 1,360
General fund equity investments ⁽⁵⁾	(1,140)	(720)	(330)	340	680	1,020
Total underlying sensitivity before hedging	(4,410)	(2,650)	(1,190)	960	1,740	2,380
Impact of macro and dynamic hedge assets ⁽⁶⁾	2,690	1,580	670	(580)	(1,020)	(1,340)
Net potential impact on net income attributed to shareholders after impact of hedging	\$ (1,720)	\$ (1,070)	\$ (520)	\$ 380	\$ 720	\$ 1,040
As at December 31, 2018 (\$ millions)	-30%	-20%	-10%	+10%	+20%	+30%
Underlying sensitivity to net income attributed to shareholders⁽⁴⁾						
Variable annuity guarantees	\$ (3,650)	\$ (2,240)	\$ (1,040)	\$ 890	\$ 1,610	\$ 2,170
General fund equity investments ⁽⁵⁾	(1,150)	(780)	(390)	290	580	860
Total underlying sensitivity before hedging	(4,800)	(3,020)	(1,430)	1,180	2,190	3,030
Impact of macro and dynamic hedge assets ⁽⁶⁾	3,110	1,940	910	(820)	(1,450)	(1,930)
Net potential impact on net income attributed to shareholders after impact of hedging	\$ (1,690)	\$ (1,080)	\$ (520)	\$ 360	\$ 740	\$ 1,100

⁽¹⁾ See "Caution Related to Sensitivities" above.

⁽²⁾ The tables show the potential impact on net income attributed to shareholders resulting from an immediate 10%, 20% and 30% change in market values of publicly traded equities followed by a return to the expected level of growth assumed in the valuation of policy liabilities, excluding impacts from asset-based fees earned on assets under management and policyholder account value.

⁽³⁾ Please refer to "Sensitivity of Earnings to Changes in Assumptions" for more information on the level of growth assumed and on the net income sensitivity to changes in these long-term assumptions.

⁽⁴⁾ Defined as earnings sensitivity to a change in public equity markets including settlements on reinsurance contracts, but before the offset of hedge assets or other risk mitigants.

⁽⁵⁾ This impact for general fund equity investments includes general fund investments supporting our policy liabilities, investment in seed money investments (in new segregated and mutual funds made by Corporate and Other segment) and the impact on policy liabilities related to the projected future fee income on variable universal life and other unit linked products. The impact does not include: (i) any potential impact on public equity weightings; (ii) any gains or losses on AFS public equities held in the Corporate and Other segment; or (iii) any gains or losses on public equity investments held in Manulife Bank. The participating policy funds are largely self-supporting and generate no material impact on net income attributed to shareholders as a result of changes in equity markets.

⁽⁶⁾ Includes the impact of rebalancing equity hedges in the macro and dynamic hedging program. The impact of dynamic hedge rebalancing represents the impact of rebalancing equity hedges for dynamically hedged variable annuity guarantee best estimate liabilities at 5% intervals but does not include any impact in respect of other sources of hedge ineffectiveness (e.g. fund tracking, realized volatility and equity, interest rate correlations different from expected among other factors).

Changes in equity markets impact our available and required components of the LICAT total ratio. The following table shows the potential impact to MLI's LICAT total ratio resulting from changes in public equity market values.

Potential immediate impact on MLI's LICAT total ratio arising from public equity returns different than the expected return for policy liability valuation^{(1),(2),(3)}

Percentage points	Impact on MLI's LICAT total ratio					
	-30%	-20%	-10%	+10%	+20%	+30%
December 31, 2019	(5)	(3)	(1)	1	4	5
December 31, 2018	(6)	(4)	(2)	1	5	7

⁽¹⁾ See "Caution Related to Sensitivities" above. In addition, estimates exclude changes to the net actuarial gains/losses with respect to the Company's pension obligations as a result of changes in equity markets, as the impact on the quoted sensitivities is not considered to be material.

⁽²⁾ The potential impact is shown assuming that the change in value of the hedge assets does not completely offset the change in the dynamically hedged variable annuity guarantee liabilities. The estimated amount that would not be completely offset relates to our practices of not hedging the provisions for adverse deviation and of rebalancing equity hedges for dynamically hedged variable annuity liabilities at 5% intervals.

⁽³⁾ OSFI rules for segregated fund guarantees reflect full capital impacts of shocks over 20 quarters within a prescribed range. As such, the deterioration in equity markets could lead to further increases in capital requirements after the initial shock.

Interest Rate and Spread Risk Sensitivities and Exposure Measures

At December 31, 2019, we estimated the sensitivity of our net income attributed to shareholders to a 50 basis point parallel decline in interest rates to be a charge of \$100 million, and to a 50 basis point increase in interest rates to be a charge of \$100 million.

The table below shows the potential impact on net income attributed to shareholders from a 50 basis point parallel move in interest rates. This includes a change of 50 basis points in current government, swap and corporate rates for all maturities across all markets with no change in credit spreads between government, swap and corporate rates, and with a floor of zero on government rates where government rates are not currently negative, relative to the rates assumed in the valuation of policy liabilities, including embedded derivatives. For variable annuity guarantee liabilities that are dynamically hedged, it is assumed that interest rate hedges are rebalanced at 20 basis point intervals.

As the sensitivity to a 50 basis point change in interest rates includes any associated change in the applicable reinvestment scenarios, the impact of changes to interest rates for less than, or more than 50 basis points is unlikely to be linear. Furthermore, our sensitivities are not consistent across all regions in which we operate, and the impact of yield curve changes will vary depending upon the geography where the change occurs. Reinvestment assumptions used in the valuation of policy liabilities tend to amplify the negative effects of a decrease in interest rates and dampen the positive effects of interest rate increases. This is because the reinvestment assumptions used in the valuation of our insurance liabilities are based on interest rate scenarios and calibration criteria set by the Canadian Actuarial Standards Board, while our interest rate hedges are valued using current market interest rates. Therefore, in any particular quarter, changes to the reinvestment assumptions are not fully aligned to changes in current market interest rates especially when there is a significant change in the shape of the interest rate curve. As a result, the impact from non-parallel movements may be materially different from the estimated impact of parallel movements. For example, if long-term interest rates increase more than short-term interest rates (sometimes referred to as a steepening of the yield curve) in North America, the decrease in the value of our swaps may be greater than the decrease in the value of our insurance liabilities. This could result in a charge to net income attributed to shareholders in the short-term even though the rising and steepening of the yield curve, if sustained, may have a positive long-term economic impact.

The potential impact on net income attributed to shareholders does not take into account any future potential changes to our URR assumptions or calibration criteria for stochastic risk-free rates. At December 31, 2019, we estimated the sensitivity of our net income attributed to shareholders to a 10 basis point reduction in the URR in all geographies, and a corresponding change to stochastic risk-free modeling, to be a charge of \$350 million (post-tax); and note that the impact of changes to the URR are not linear. The long-term URR for risk-free rates in Canada is prescribed at 3.05% and we use the same assumption for the U.S. Our assumption for Japan is 1.6%. The ASB does not anticipate an update to this promulgation prior to the effective date of IFRS 17, expected to be 2022 at the earliest.

The potential impact on net income attributable to shareholders does not take into account other potential impacts of lower interest rate levels, for example, increased strain on the sale of new business or lower interest earned on our surplus assets. The impact also does not reflect any unrealized gains or losses on AFS fixed income assets held in our Corporate and Other segment. Changes in the market value of these assets may provide a natural economic offset to the interest rate risk arising from our product liabilities. In order for there to also be an accounting offset, the Company would need to realize a portion of the AFS fixed income asset unrealized gains or losses. It is not certain we would realize any of the unrealized gains or losses available.

The impact does not reflect any potential effect of changing interest rates to the value of our ALDA assets. Rising interest rates could negatively impact the value of our ALDA assets (see "Critical Actuarial and Accounting Policies – Fair Value of Invested Assets", below). More information on ALDA can be found under the section "Alternative Long-Duration Asset Performance Risk Sensitivities and Exposure Measures", below.

Under LICAT, changes in unrealized gains or losses in our AFS bond portfolio resulting from interest rate shocks tend to dominate capital sensitivities. As a result, the reduction in interest rates improves LICAT total ratios and vice-versa.

The following table shows the potential impact on net income attributed to shareholders including the change in the market value of AFS fixed income assets held in our Corporate and Other segment, which could be realized through the sale of these assets.

Potential impact on net income attributed to shareholders and MLI's LICAT total ratio of an immediate parallel change in interest rates relative to rates assumed in the valuation of policy liabilities^{(1),(2),(3),(4)}

As at December 31,	2019		2018	
	-50bp	+50bp	-50bp	+50bp
Net income attributed to shareholders (\$ millions)				
Excluding change in market value of AFS fixed income assets held in the Corporate and Other segment	\$ (100)	\$ (100)	\$ (100)	\$ 100
From fair value changes in AFS fixed income assets held in the Corporate and Other segment, if realized	1,700	(1,600)	1,600	(1,500)
MLI's LICAT total ratio (Percentage points)				
LICAT total ratio change in percentage points ⁽⁵⁾	4	(4)	3	(3)

- (1) See "Caution Related to Sensitivities" above. In addition, estimates exclude changes to the net actuarial gains/losses with respect to the Company's pension obligations as a result of changes in interest rates, as the impact on the quoted sensitivities is not considered to be material.
- (2) Includes guaranteed insurance and annuity products, including variable annuity contracts as well as adjustable benefit products where benefits are generally adjusted as interest rates and investment returns change, a portion of which have minimum credited rate guarantees. For adjustable benefit products subject to minimum rate guarantees, the sensitivities are based on the assumption that credited rates will be floored at the minimum.
- (3) The amount of gain or loss that can be realized on AFS fixed income assets held in the Corporate and Other segment will depend on the aggregate amount of unrealized gain or loss.
- (4) Sensitivities are based on projected asset and liability cash flows and the impact of realizing fair value changes in AFS fixed income is based on the holdings at the end of the period.
- (5) LICAT impacts include realized and unrealized fair value changes in AFS fixed income assets. LICAT impacts do not reflect the impact of the scenario switch discussed below.

The following tables show the potential impact on net income attributed to shareholders resulting from a change in corporate spreads and swap spreads over government bond rates for all maturities across all markets with a floor of zero on the total interest rate, relative to the spreads assumed in the valuation of policy liabilities.

Potential impact on net income attributed to shareholders and MLI's LICAT total ratio arising from changes to corporate spreads and swap spreads^{(1),(2),(3)}

Corporate spreads ^{(4),(5)}	2019		2018	
	-50bp	+50bp	-50bp	+50bp
As at December 31,				
Net income attributed to shareholders (\$ millions) ⁽⁶⁾	\$ (800)	\$ 800	\$ (600)	\$ 600
MLI's LICAT total ratio (change in percentage points) ⁽⁷⁾	(7)	5	(5)	5

Swap spreads	2019		2018	
	-20bp	+20bp	-20bp	+20bp
As at December 31,				
Net income attributed to shareholders (\$ millions)	\$ 100	\$ (100)	\$ 100	\$ (100)
MLI's LICAT total ratio (change in percentage points) ⁽⁷⁾	nil	nil	nil	nil

- (1) See "Caution Related to Sensitivities" above.
- (2) The impact on net income attributed to shareholders assumes no gains or losses are realized on our AFS fixed income assets held in the Corporate and Other segment and excludes the impact of changes in segregated fund bond values due to changes in credit spreads. The participating policy funds are largely self-supporting and generate no material impact on net income attributed to shareholders as a result of changes in corporate and swap spreads.
- (3) Sensitivities are based on projected asset and liability cash flows.
- (4) Corporate spreads are assumed to grade to the long-term average over five years.
- (5) As the sensitivity to a 50 basis point decline in corporate spreads includes the impact of a change in deterministic reinvestment scenarios where applicable, the impact of changes to corporate spreads for less than, or more than, the amounts indicated are unlikely to be linear.
- (6) The impact from a 50 basis point change in corporate spreads increased from December 31, 2018 as the changes in actuarial methods and assumptions, outlined below (see "Critical Actuarial and Accounting Policies"), resulted in a lengthening of the policy liability cash flows, a portion of which is assumed to be supported by corporate bonds.
- (7) LICAT impacts include realized and unrealized fair value change in AFS fixed income assets. Under LICAT, spread movements are determined from a selection of investment grade bond indices with BBB and better bonds for each jurisdiction. For LICAT, we use the following indices: FTSE TMX Canada All Corporate Bond Index, Barclays USD Liquid Investment Grade Corporate Index, and Nomura-BPI (Japan). LICAT impacts presented for corporate spreads do not reflect the impact of the scenario switch discussed below.

Swap spreads remain at low levels, and if they were to rise, this could generate material charges to net income attributed to shareholders. Swap spread sensitivity decreased primarily due to additional shortening swaps put in place.

LICAT Scenario Switch

Typically, the reduction in interest rates improves LICAT capital ratios and vice-versa. However, when interest rates decline past a certain threshold, reflecting the combined movement in risk-free rates and corporate spreads, a different prescribed interest rate stress scenario needs to be taken into account in the LICAT ratio calculation according to the OSFI guideline.

The OSFI guideline specifies four stress scenarios for interest rates and prescribes the methodology for determining which scenario needs to be applied by geographic region based on current market inputs and the Company's balance sheet.

We estimate the potential impact of a switch in the scenarios would be approximately a five percentage point decrease in MLI's total LICAT ratio.¹ This negative impact of a potential switch in scenarios is not reflected in the stated risk-free rate and corporate spread sensitivities, as it is a one-time impact. After this one-time event, the sensitivity of the LICAT ratio to further decreases in risk-free interest rates would again improve the LICAT capital position as stated in the table above.

The level of interest rates and corporate spreads that would trigger a switch in the scenarios is dependent on market conditions and movements in the Company's asset and liability position. The scenario switch could reverse in response to subsequent increases in rates and/or spreads.

Alternative Long-Duration Asset Performance Risk Sensitivities and Exposure Measures

The following table shows the potential impact on net income attributed to shareholders resulting from an immediate 10% change in market values of ALDA followed by a return to the expected level of growth assumed in the valuation of policy liabilities. If market values were to remain flat for an entire year, the potential impact would be roughly equivalent to an immediate decline in market values equal to the expected level of annual growth assumed in the valuation of policy liabilities. Further, if after market values dropped 10% they continued to decline, remained flat, or grew more slowly than assumed in the valuation of policy liabilities, the potential impact on net income attributed to shareholders could be considerably more than shown. Refer to "Sensitivity of Earnings to Changes in Assumptions" below, for more information on the level of growth assumed and on the net income sensitivity to changes in these long-term assumptions.

ALDA includes commercial real estate, timber and farmland real estate, oil and gas direct holdings, and private equities, some of which relate to oil and gas.

Potential impact on net income attributed to shareholders arising from changes in ALDA returns^{(1),(2),(3),(4),(5),(6),(7)}

As at December 31, (\$ millions)	2019		2018	
	-10%	+10%	-10%	+10%
Real estate, agriculture and timber assets	\$ (1,300)	\$ 1,200	\$ (1,300)	\$ 1,200
Private equities and other ALDA	(1,800)	1,700	(1,600)	1,600
Alternative long-duration assets	\$ (3,100)	\$ 2,900	\$ (2,900)	\$ 2,800

(1) See "Caution Related to Sensitivities" above.

(2) This impact is calculated as at a point-in-time impact and does not include: (i) any potential impact on ALDA weightings or (ii) any gains or losses on ALDA held in the Corporate and Other segment.

(3) The participating policy funds are largely self-supporting and generate no material impact on net income attributed to shareholders as a result of changes in ALDA returns. For some classes of ALDA, where there is not an appropriate long-term benchmark available, the return assumptions used in valuation are not permitted by the Standards of Practice and CIA guidance to result in a lower reserve than an assumption based on a historical return benchmark for public equities in the same jurisdiction.

(4) Net income impact does not consider any impact of the market correction on assumed future return assumptions.

(5) Please refer to "Sensitivity of Earnings to Changes in Assumptions" below, for more information on the level of growth assumed and on the net income sensitivity to changes in these long-term assumptions.

(6) The impact of changes to the portfolio asset mix supporting our North American legacy businesses are reflected in the sensitivities when the changes take place.

(7) The impact from a 10% change in ALDA returns increased from December 31, 2018 as the changes in actuarial methods and assumptions, outlined below (see "Critical Actuarial and Accounting Policies"), resulted in a lengthening of the policy liability cash flows, a portion of which is assumed to be supported by ALDA.

Foreign Exchange Risk Sensitivities and Exposure Measures

We generally match the currency of our assets with the currency of the insurance and investment contract liabilities they support, with the objective of mitigating risk of loss arising from currency exchange rate changes. As at December 31, 2019, we did not have a material unmatched currency exposure.

The following table shows the potential impact on core earnings of a 10% change in the Canadian dollar relative to our other key operating currencies.

Potential impact on core earnings of changes in currency^{(1),(2)}

As at December 31, (\$ millions)	2019		2018	
	+10% strengthening	-10% weakening	+10% strengthening	-10% weakening
10% change in the Canadian dollar relative to the U.S. dollar and the Hong Kong dollar	\$ (360)	\$ 360	\$ (340)	\$ 340
10% change in the Canadian dollar relative to the Japanese yen	(50)	50	(60)	60

(1) This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" below.

(2) See "Caution Related to Sensitivities" above.

LICAT regulatory capital ratios are also sensitive to the fluctuations in the Canadian dollar relative to our other key operating currencies. The direction and materiality of this sensitivity varies across various capital ratios.

¹ See "Caution Related to Sensitivities" above.

Liquidity Risk Exposure Measures

We manage liquidity levels of the consolidated group and key subsidiaries against established thresholds. These thresholds are based on liquidity stress scenarios over different time horizons.

Increased use of derivatives for hedging purposes has necessitated greater emphasis on measurement and management of contingent liquidity risk related to these instruments, in particular the movement of “over-the-counter” derivatives to central clearing in the U.S. and Japan places an emphasis on cash as the primary source of liquidity as opposed to security holdings. The market value of our derivative portfolio is therefore regularly stress tested to assess the potential collateral and cash settlement requirements under various market conditions.

Manulife Bank (the “Bank”) has a standalone liquidity risk management framework. The framework includes stress testing, cash flow modeling, a funding plan and a contingency plan. The Bank has an established securitization infrastructure which enables the Bank to access a range of funding and liquidity sources. The Bank models extreme but plausible stress scenarios that demonstrate that the Bank has a sufficient pool of highly liquid money market securities and holdings of sovereign bonds, near-sovereign bonds and other liquid marketable securities, which when combined with the Bank’s capacity to securitize residential mortgage assets provides sufficient liquidity to meet potential requirements under these stress scenarios.

Similarly, Global Wealth and Asset Management has a standalone liquidity risk management framework.

m. Credit Risk

Credit risk is the risk of loss due to the inability or unwillingness of a borrower or counterparty to fulfill its payment obligations.

Credit Risk Management Strategy

Credit risk is governed by the Credit Committee which oversees the overall credit risk management program. The Company has established objectives for overall quality and diversification of our general fund investment portfolio and criteria for the selection of counterparties, including derivative counterparties, reinsurers and insurance providers. Our policies establish exposure limits by borrower, corporate connection, quality rating, industry, and geographic region, and govern the usage of credit derivatives. Corporate connection limits vary according to risk rating. Our general fund fixed income investments are primarily public and private investment grade bonds and commercial mortgages. We have a program for selling Credit Default Swaps (“CDS”) that employs a highly selective, diversified and conservative approach. CDS decisions follow the same underwriting standards as our cash bond portfolio and the addition of this asset class allows us to better diversify our overall credit portfolio.

Our credit granting units follow a defined evaluation process that provides an objective assessment of credit proposals. We assign a risk rating, based on a standardized 22-point scale consistent with those of external rating agencies, following a detailed examination of the borrower that includes a review of business strategy, market competitiveness, industry trends, financial strength, access to funds, and other risks facing the counterparty. We assess and update risk ratings regularly. For additional input to the process, we also assess credit risks using a variety of industry standard market-based tools and metrics. We map our risk ratings to pre-established probabilities of default and loss given defaults, based on historical industry and Company experience, and to resulting default costs.

We establish delegated credit approval authorities and make credit decisions on a case-by-case basis at a management level appropriate to the size and risk level of the transaction, based on the delegated authorities that vary according to risk rating. Major credit decisions are approved by the Credit Committee and the largest decisions are approved by the CEO and, in certain cases, by the Board of Directors.

We limit the types of authorized derivatives and applications and require pre-approval of all derivative application strategies and regular monitoring of the effectiveness of derivative strategies. Derivative counterparty exposure limits are established based on a minimum acceptable counterparty credit rating (generally A- from internationally recognized rating agencies). We measure derivative counterparty exposure as net potential credit exposure, which takes into consideration mark-to-market values of all transactions with each counterparty, net of any collateral held, and an allowance to reflect future potential exposure. Reinsurance counterparty exposure is measured reflecting the level of ceded liabilities net of collateral held. The creditworthiness of all reinsurance counterparties is reviewed internally on a regular basis.

Regular reviews of the credits within the various portfolios are undertaken with the goal of identifying changes to credit quality and, where appropriate, taking corrective action. Prompt identification of problem credits is a key objective.

We establish an allowance for losses on a loan when it becomes impaired as a result of deterioration in credit quality, to the extent there is no longer assurance of timely realization of the carrying value of the loan and related investment income. We reduce the carrying value of an impaired loan to its estimated net realizable value when we establish the allowance. We establish an allowance for losses on reinsurance contracts when a reinsurance counterparty becomes unable or unwilling to fulfill its contractual obligations. We base the allowance for loss on current recoverables and ceded policy liabilities. There is no assurance that the allowance for losses will be adequate to cover future potential losses or that additional allowances or asset write-downs will not be required.

Policy liabilities include general provisions for credit losses from future asset impairments.

Our credit policies, procedures and investment strategies are established under a strong governance framework and are designed to ensure that risks are identified, measured and monitored consistent with our risk appetite. We seek to actively manage credit exposure in our investment portfolio to reduce risk and minimize losses, and derivative counterparty exposure is managed proactively. However, we could experience volatility on a quarterly basis and losses could potentially rise above long-term expected and historical levels.

Credit Risk Exposure Measures

As at December 31, 2019 and December 31, 2018, for every 50% that credit defaults over the next year exceed the rates provided for in policy liabilities, net income attributed to shareholders would be reduced by \$69 million and \$62 million in each year, respectively. Credit downgrades for fixed income investments would adversely impact our regulatory capital, as required capital levels for such investments are based on the credit quality of each instrument. In addition, credit downgrades could also be higher than assumed in policy liabilities, resulting in policy liability increases and a reduction in net income attributed to shareholders.

The table below shows net impaired assets and allowances for loan losses.

Net Impaired Assets and Loan Losses

As at December 31,

(\$ millions, unless otherwise stated)

	2019	2018
Net impaired fixed income assets	\$ 234	\$ 179
Net impaired fixed income assets as a % of total invested assets	0.062%	0.051%
Allowance for loan losses	\$ 20	\$ 95

n. Product Risk

Product risk is the risk of failure to design, implement and maintain a product or service to achieve expected outcomes and the risk of loss due to actual experience emerging differently than assumed when a product was designed and priced.

Product Risk Management

Product risk is governed by the Product Oversight Committee for the insurance business and by the Global WAM Risk Committee for global WAM business.

Insurance Product Risk Management Strategy

The Product Oversight Committee oversees the overall insurance risk management program. The Product Oversight Committee has established a broad framework for managing insurance risk under a set of policies, standards and guidelines, to ensure that our product offerings align with our risk taking philosophy and risk limits, and achieve acceptable profit margins. These cover:

- product design features
- use of reinsurance
- pricing models and software
- internal risk based capital allocations
- target profit objectives
- pricing methods and assumption setting
- stochastic and stress scenario testing
- required documentation
- review and approval processes
- experience monitoring programs

In each business unit that sells insurance, we designate individual pricing officers who are accountable for pricing activities, chief underwriters who are accountable for underwriting activities and chief claims risk managers who are accountable for claims activities. Both the pricing officer and the general manager of each business unit approve the design and pricing of each product, including key claims, policyholder behaviour, investment return and expense assumptions, in accordance with global policies and standards. Risk management functions provide additional oversight, review and approval of material product and pricing initiatives, as well as material underwriting initiatives. Actuarial functions provide oversight review and approval of policy liability valuation methods and assumptions. In addition, both risk and actuarial functions review and approve new reinsurance arrangements. We perform annual risk and compliance self-assessments of the product development, pricing, underwriting and claims activities of all insurance businesses. To leverage best practices, we facilitate knowledge transfer between staff working with similar businesses in different geographies.

We utilize a global underwriting manual intended to ensure insurance underwriting practices for direct written life business are consistent across the organization while reflecting local conditions. Each business unit establishes underwriting policies and procedures, including criteria for approval of risks and claims adjudication policies and procedures.

We apply retention limits per insured life that are intended to reduce our exposure to individual large claims which are monitored in each business unit. These retention limits vary by market and jurisdiction. We reinsure exposure in excess of these limits with other companies (see "Risk Factors – Product Risk Factors – External market conditions determine the availability, terms and cost of reinsurance protection", below). Our current global life retention limit is US\$30 million for individual policies (US\$35 million for survivorship life policies) and is shared across businesses. We apply lower limits in some markets and jurisdictions. We aim to further reduce exposure to claims concentrations by applying geographical aggregate retention limits for certain covers. Enterprise-wide, we aim to reduce the likelihood of high aggregate claims by operating globally, insuring a wide range of unrelated risk events, and reinsuring some risks. We seek to actively manage the Company's aggregate exposure to each of policyholder behaviour risk and claims risk against enterprise-wide economic capital limits. Policyholder behaviour risk limits cover the combined risk arising from policy lapses and surrenders, withdrawals and other policyholder driven activity. The claims risk limits cover the combined risk arising from mortality, longevity and morbidity.

Internal experience studies, as well as trends in our experience and that of the industry, are monitored to update current and projected claims and policyholder behaviour assumptions, resulting in updates to policy liabilities as appropriate.

Global Wealth and Asset Management (“Global WAM”) Product Risk Management Strategy

Global WAM product risk is governed by the Global WAM Risk Management Committee (the “Committee”), which reviews and approves notable new products prior to launch. The Committee has established a framework for managing risk under a set of policies, standards and guidelines to ensure that notable product offerings align with Global WAM risk taking philosophy and risk appetite.

Global WAM Risk Management also provides oversight of notable changes to existing products/solutions on the various Global WAM platforms.

o. Operational Risk

Operational risk is the risk of loss resulting from inadequate or failed internal processes, systems failures, human performance failures or from external events.

Operational Risk Management Strategy

Our corporate governance practices, corporate values, and integrated enterprise-wide approach to managing risk set the foundation for mitigating operational risks. This base is further strengthened by internal controls and systems, compensation programs, and seeking to hire and retain trained and competent people throughout the organization. We align compensation programs with business strategy, long-term shareholder value and good governance practices, and we benchmark these compensation practices against peer companies.

We have an enterprise operational risk management framework that sets out the processes we use to identify, assess, manage, mitigate and report on significant operational risk exposures. Execution of our operational risk management strategy supports the drive towards a focus on the effective management of our key global operational risks. We have an Operational Risk Committee, which is the main decision-making committee for all operational risk matters and which has oversight responsibility for operational risk strategy, management and governance. We have enterprise-wide risk management programs for specific operational risks that could materially impact our ability to do business or impact our reputation.

Legal and Regulatory Risk Management Strategy

Global Compliance oversees our regulatory compliance program and function, supported by designated Chief Compliance Officers in every segment. The program is designed to promote compliance with regulatory obligations worldwide and to assist in making the Company’s employees aware of the laws and regulations that affect it, and the risks associated with failing to comply. Segment Compliance groups monitor emerging legal and regulatory issues and changes and prepare us to address new requirements. Global Compliance also independently assesses and monitors the effectiveness of a broad range of regulatory compliance processes and business practices against potential legal, regulatory, fraud and reputation risks, and allows significant issues to be escalated and proactively mitigated. Among these processes and business practices are: privacy (i.e. handling of personal and other confidential information), sales and marketing practices, sales compensation practices, asset management practices, fiduciary responsibilities, employment practices, underwriting and claims processing, product design, the Ethics Hotline, and regulatory filings. In addition, we have policies, processes and controls in place to help protect the Company, our customers and other related third parties from acts of fraud and from risks associated with money laundering and terrorist financing. Audit Services, Global Compliance and Segment Compliance personnel periodically assess the effectiveness of the control environment. For further discussion of government regulation and legal proceedings, refer to “Government Regulation” in MFC’s Annual Information Form dated February 12, 2020 and note 18 of the 2019 Annual Consolidated Financial Statements.

Business Continuity Risk Management Strategy

We have an enterprise-wide business continuity and disaster recovery program. This includes policies, plans and procedures that seek to minimize the impact of natural or human-made disasters, and is designed to ensure that key business functions can continue normal operations in the event of a major disruption. Each business unit is accountable for preparing and maintaining detailed business continuity plans and processes. The global program incorporates periodic scenario analysis designed to validate the assessment of both critical and non-critical units, as well as the establishment and testing of appropriate business continuity plans for all critical functions. The business continuity team establishes and regularly tests crisis management plans and global crisis communications protocols. We maintain off-site backup facilities and failover capability designed to minimize downtime and accelerate system recovery.

Technology & Information Security Risk Management Strategy

Our Technology Risk Management function provides strategy, direction, and oversight and facilitates governance for all technology risk domain activities across the Company. The scope of this function includes: reducing information risk exposures by introducing a robust enterprise information risk management framework and supporting infrastructure for proactively identifying, managing, monitoring and reporting on critical information risk exposures; promoting transparency and informed decision-making by building and maintaining information risk profiles and risk dashboards for Enterprise Technology & Services and segments aligned with enterprise and operational risk reporting; providing advisory services to Global Technology and the segments around current and emerging technology risks and their impact to the Company’s information risk profile; and reducing vendor information risk exposures by incorporating sound information risk management practices into sourcing, outsourcing and offshoring initiatives and programs.

The enterprise-wide information security program, which is overseen by the Chief Information Risk Officer, seeks to mitigate information security risks. This program establishes the information and cyber security framework for the Company, including governance, policies and standards, and appropriate controls to protect information and computer systems. We also have annual security awareness training sessions for all employees.

Many jurisdictions in which we operate are implementing more stringent privacy legislation. Our global privacy program, overseen by our Chief Privacy Officer, seeks to manage the risk of privacy breaches. It includes policies and standards, ongoing monitoring of emerging privacy legislation, and a network of privacy officers. Processes have been established to provide guidance on handling personal information and for reporting privacy incidents and issues to appropriate management for response and resolution.

In addition, the Chief Information Risk Officer, the Chief Privacy Officer, and their teams work closely on information security and privacy matters.

Human Resource Risk Management Strategy

We have a number of human resource policies, practices and programs in place that seek to manage the risks associated with attracting and retaining top talent. These include recruiting programs at every level of the organization, training and development programs for our individual contributors and people leaders, employee engagement surveys, and competitive compensation programs that are designed to attract, motivate and retain high-performing and high-potential employees.

Model Risk Management Strategy

We have designated model risk management teams working closely with model owners and users that seek to manage model risk. Our model risk oversight program includes processes intended to ensure that our critical business models are conceptually sound and used as intended, and to assess the appropriateness of the calculations and outputs.

Third-Party Risk Management Strategy

Our governance framework to address third-party risk includes appropriate policies (such as our Global Outsourcing and Vendor Risk Management Policy and Global Procurement Policy), standards and procedures, and monitoring of ongoing results and contractual compliance of third-party arrangements.

Project Risk Management Strategy

To seek to ensure that key projects are successfully implemented and monitored by management, we have a Global Strategy and Transformation Office, which is responsible for establishing policies and standards for project management. Our policies, standards and practices are benchmarked against leading practices.

9. Capital Management Framework

Manulife seeks to manage its capital with the objectives of:

- Operating with sufficient capital to be able to honour all commitments to its policyholders and creditors with a high degree of confidence;
- Retaining the ongoing confidence of regulators, policyholders, rating agencies, investors and other creditors in order to ensure access to capital markets; and
- Optimizing return on capital to meet shareholders' expectations subject to constraints and considerations of adequate levels of capital established to meet the first two objectives.

Capital is managed and monitored in accordance with the Capital Management Policy. The Policy is reviewed and approved by the Board of Directors annually and is integrated with the Company's risk and financial management frameworks. It establishes guidelines regarding the quantity and quality of capital, internal capital mobility, and proactive management of ongoing and future capital requirements.

Our capital management framework takes into account the requirements of the Company as a whole as well as the needs of each of our subsidiaries. Internal capital targets are set above regulatory requirements, and consider a number of factors, including expectations of regulators and rating agencies, results of sensitivity and stress testing and our own risk assessments. We monitor against these internal targets and initiate actions appropriate to achieving our business objectives.

We periodically assess the strength of our capital position under various stress scenarios. The annual Dynamic Capital Adequacy Testing ("DCAT") typically quantifies the financial impact of economic events arising from shocks in public equity and other markets, interest rates and credit, amongst others. Our 2019 DCAT results demonstrate that we would have sufficient assets, under the various adverse scenarios tested, to discharge our policy liabilities. This conclusion was also supported by a variety of other stress tests conducted by the Company.

We use an Economic Capital ("EC") framework to inform our internal view of the level of required capital and available capital. The EC framework is a key component of the Own Risk and Solvency Assessment ("ORSA") process, which ties together our risk management, strategic planning and capital management practices to confirm that our capital levels continue to be adequate from an economic perspective.

Capital management is also integrated into our product planning and performance management practices.

The composition of capital between equity and other capital instruments impacts the financial leverage ratio which is an important consideration in determining the Company's financial strength and credit ratings. The Company monitors and rebalances its capital mix through capital issuances and redemptions.

a. Financing Activities

Securities transactions

During 2019, we redeemed \$1.5 billion of debt securities at par.

(\$ millions)	Redeemed
2.811% MLI Subordinated debentures, redeemed on Feb 21, 2019	500
7.535% MFCT II Senior debenture notes, redeemed on Dec 31, 2019	1,000
Total	\$ 1,500

In addition, during the fourth quarter of 2019, we announced the intention to redeem \$0.5 billion of 2.64% Fixed/Floating Subordinated Debentures in January 2020.

During 2019, we had in place the normal course issuer bid program and the Dividend Reinvestment Program ("DRIP"), both noted below.

Normal Course Issuer Bid

On November 12, 2019, MFC announced that the Toronto Stock Exchange ("TSX") approved a normal course issuer bid ("NCIB") permitting the purchase by MFC for cancellation of up to 58 million MFC common shares. Pursuant to the Notice of Intention filed with the TSX, purchases under the NCIB commenced on November 14, 2019 and will continue until November 13, 2020, when the NCIB expires, or such earlier date as MFC completes its purchases. As of December 31, 2019, MFC purchased and subsequently cancelled 6.3 million of its common shares pursuant to the NCIB at an average price of \$25.91 per common share for a total cost of \$163 million.

MFC's previous NCIB which was announced on November 12, 2018 and amended on February 19, 2019, expired on November 13, 2019. MFC purchased and subsequently cancelled 74.5 million of its common shares pursuant to the previous NCIB at an average price of \$22.20 per common share for a total cost of \$1.76 billion.

During 2019, MFC purchased and subsequently cancelled 57.6 million of its common shares at an average price of \$23.22 per common share for a total cost of \$1.3 billion, including 51.3 million common shares for a total cost of \$1.2 billion that were purchased under the previous NCIB.

b. Consolidated capital

As at December 31,

(\$ millions)

	2019	2018	2017
Non-controlling interests	\$ 1,211	\$ 1,093	\$ 929
Participating policyholders' equity	(243)	94	221
Preferred shares	3,822	3,822	3,577
Common shareholders' equity ⁽¹⁾	45,316	42,142	37,436
Total equity	50,106	47,151	42,163
Adjusted for accumulated other comprehensive loss on cash flow hedges	(143)	(127)	(109)
Total equity excluding accumulated other comprehensive loss on cash flow hedges	50,249	47,278	42,272
Qualifying capital instruments	7,120	8,732	8,387
Consolidated capital⁽²⁾	\$ 57,369	\$ 56,010	\$ 50,659

⁽¹⁾ Common shareholders' equity is equal to total shareholders' equity less preferred shares.

⁽²⁾ Consolidated capital does not include \$4.5 billion (2018 – \$4.8 billion, 2017 – \$4.8 billion) of MFC senior debt as this form of financing does not meet OSFI's definition of regulatory capital at the MFC level. The Company has down-streamed the proceeds from this financing into operating entities in a form that qualifies as regulatory capital at the subsidiary level.

Consolidated capital was \$57.4 billion as at December 31, 2019 compared with \$56.0 billion as at December 31, 2018, an increase of approximately \$1.4 billion. The increase was primarily driven by net income attributed to shareholders net of dividends of \$3.5 billion and net increase in AOCI of \$0.2 billion, partially offset by capital redemptions noted above of \$1.5 billion and the net impact of share buybacks and issuance of shares for the dividend reinvestment program of \$0.6 billion. The net increase in AOCI was due to the impact of lower interest rates and higher equity markets on assets classified as AFS, mostly offset by a stronger Canadian dollar compared to the U.S. dollar.

c. Remittance of Capital

As part of its capital management, Manulife promotes internal capital mobility so that Manulife's parent company, MFC, has access to funds to meet its obligations and to optimize the use of excess capital. Cash remittance is defined as the cash remitted or payable to the Group from operating subsidiaries and excess capital generated by standalone Canadian operations. It is one of the key metrics used by management to evaluate our financial flexibility. In 2019, MFC subsidiaries delivered \$2.8 billion in remittances compared with \$4.0 billion in 2018.

d. Financial Leverage Ratio

MFC's financial leverage ratio decreased to 25.1% as at December 31, 2019 from 28.6% as at December 31, 2018, driven by net income attributed to shareholders net of dividends, the redemption of \$1.5 billion of securities, and the increase in values of AFS securities, partially offset by the net impact of share buybacks and issuance of shares for the dividend reinvestment program, and the impact of a stronger Canadian dollar compared with the U.S. dollar.

e. Common Shareholder Dividends

The declaration and payment of shareholder dividends and the amount thereof are at the discretion of the Board of Directors and depend upon various factors, including the results of operations, financial condition and future prospects of the Company and taking into account regulatory restrictions on the payment of shareholder dividends, as well as any other factors deemed relevant by the Board of Directors.

Common Shareholder Dividends Paid

For the years ended December 31,

\$ per share

	2019	2018	2017
Dividends paid	\$ 1.000	\$ 0.910	\$ 0.820

The Company offers a Dividend Reinvestment Program ("DRIP") whereby shareholders may elect to automatically reinvest dividends in the form of MFC common shares instead of receiving cash. The offering of the program and its terms of execution are subject to the Board of Directors' discretion.

During 2019, the required common shares in connection with the DRIP were purchased from treasury with a two per cent (2%) discount from the market price. In 2019, we issued 30.9 million common shares from treasury for a total consideration of \$723 million under this program.

f. Regulatory Capital Position¹

MFC and MLI are regulated by OSFI and are subject to consolidated risk based capital requirements. Manulife monitors and manages its consolidated capital in compliance with the applicable OSFI LICAT guideline. Under this regime our consolidated available capital is

¹ The "Risk Factors" section of the MD&A outlines a number of regulatory capital risks.

measured against a required amount of risk capital determined in accordance with the guideline. For regulatory purposes, LICAT available capital is based on the above consolidated capital with adjustments for certain deductions, limits and restrictions, as mandated by the LICAT guideline.

Manulife's operating activities are conducted within MLI and its subsidiaries. MLI's LICAT total ratio was 140% as at December 31, 2019, compared with 143% as at December 31, 2018. The three percentage point decline from December 31, 2018 was primarily driven by the narrowing of corporate spreads, and \$2.0 billion of capital redemptions¹, partially offset by the decrease in risk-free rates and actions to release capital in our North American legacy businesses.

MFC's LICAT total ratio was 129% as at December 31, 2019 compared with 132% as at December 31, 2018. The differences between the MLI and MFC ratios were largely due to the \$4.5 billion (2018 – \$4.8 billion) of MFC senior debt outstanding that does not qualify as available capital at the MFC level but, based on the form it was down-streamed to MLI, it qualifies as regulatory capital at the MLI level.

The LICAT total ratios as at December 31, 2019 resulted in excess capital of \$22.4 billion over OSFI's supervisory target ratio of 100% for MLI, and \$22.4 billion over OSFI's regulatory minimum target ratio of 90% for MFC (no supervisory target is applicable to MFC). As at December 31, 2019, all MLI's subsidiaries maintained capital levels in excess of local requirements.

g. Credit Ratings

Manulife's operating companies have strong financial strength ratings from credit rating agencies. These ratings are important factors in establishing the competitive position of insurance companies and maintaining public confidence in products being offered. Maintaining strong ratings on debt and capital instruments issued by MFC and its subsidiaries allows us to access capital markets at competitive pricing levels. Should these credit ratings decrease materially, our cost of financing may increase and our access to funding and capital through capital markets could be reduced.

During 2019, S&P, Moody's, DBRS, Fitch and A.M. Best Company ("A.M. Best") maintained their assigned ratings of MFC and its primary insurance operating companies.

The following table summarizes the financial strength and claims paying ability ratings of MLI and certain of its subsidiaries as at January 31, 2020.

Financial Strength Ratings

Subsidiary	Jurisdiction	S&P	Moody's	DBRS	Fitch	A.M. Best
The Manufacturers Life Insurance Company	Canada	AA-	A1	AA(Low)	AA-	A+ (Superior)
John Hancock Life Insurance Company (U.S.A.)	United States	AA-	A1	Not Rated	AA-	A+ (Superior)
Manulife (International) Limited	Hong Kong	AA-	Not Rated	Not Rated	Not Rated	Not Rated
Manulife Life Insurance Company	Japan	A+	Not Rated	Not Rated	Not Rated	Not Rated
Manulife (Singapore) Pte. Ltd.	Singapore	AA-	Not Rated	Not Rated	Not Rated	Not Rated

As of January 31, 2020, S&P had a stable outlook on these ratings, except for the rating for Manulife Life Insurance Company which had a positive outlook. Manulife Life Insurance Company's rating and the related outlook are constrained by the sovereign rating on Japan (A+/Positive/A-1), because the company holds a relatively high proportion of Japanese investments in its asset portfolio. In addition, for Moody's, Fitch and A.M. Best, the ratings outlook on these ratings were stable, while for DBRS the ratings outlook was positive.

¹ For LICAT, the \$2.0 billion of redemptions includes the \$0.5 billion redeemed in January 2020 (announced in December 2019) as the LICAT ratio reflects all the actual and announced capital redemptions.

10. Critical Actuarial and Accounting Policies

The preparation of Consolidated Financial Statements in conformity with IFRS requires management to make judgments, estimates and assumptions that affect the application of accounting policies and the reported amounts of assets and liabilities, and the disclosure of contingent assets and liabilities as at the date of the Consolidated Financial Statements, and the reported amounts of revenue and expenses during the reporting periods. Actual results may differ from these estimates. The most significant estimation processes relate to assumptions used in measuring insurance and investment contract liabilities, assessing assets for impairment, determining of pension and other post-employment benefit obligation and expense assumptions, determining income taxes and uncertain tax positions and fair valuation of certain invested assets. Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the year in which the estimates are revised and in any future years affected. Although some variability is inherent in these estimates, management believes that the amounts recorded are appropriate. The significant accounting policies used and the most significant judgments made by management in applying these accounting policies in the preparation of the 2019 Annual Consolidated Financial Statements are described in note 1 to the Consolidated Financial Statements.

a. Critical Actuarial Policies – Policy Liabilities (Insurance and Investment Contract Liabilities)

Policy liabilities for IFRS are valued in Canada under standards established by the Actuarial Standards Board. These standards are designed to ensure we establish an appropriate liability on the Consolidated Statements of Financial Position to cover future obligations to all our policyholders. The assumptions underlying the valuation of policy liabilities are required to be reviewed and updated on an ongoing basis to reflect recent and emerging trends in experience and changes in risk profile of the business. In conjunction with prudent business practices to manage both product and asset related risks, the selection and monitoring of appropriate valuation assumptions is designed to minimize our exposure to measurement uncertainty related to policy liabilities.

Policy liabilities have two major components: a best estimate amount and a provision for adverse deviation. The best estimate amount represents the estimated value of future policyholder benefits and settlement obligations to be paid over the term remaining on in-force policies, including the costs of servicing the policies. The best estimate amount is reduced by the future expected policy revenues and future expected investment income on assets supporting the policies, before any consideration for reinsurance ceded. To determine the best estimate amount, assumptions must be made for a number of key factors, including future mortality and morbidity rates, investment returns, rates of policy termination, and premium persistency, operating expenses, certain taxes (other than income taxes and includes temporary tax timing and permanent tax rate differences on the cash flows available to satisfy policy obligations) and foreign currency. Reinsurance is used to transfer part or all of a policy liability to another insurance company at terms negotiated with that insurance company. A separate asset for reinsurance ceded is calculated based on the terms of the reinsurance treaties that are in-force, with deductions taken for the credit standing of the reinsurance counterparties where appropriate.

To recognize the uncertainty involved in determining the best estimate actuarial liability assumptions, a provision for adverse deviation (“PfAD”) is established. The PfAD is determined by including a margin of conservatism for each assumption to allow for possible mis-estimation of, or deterioration in, future experience in order to provide greater comfort that the policy liabilities will be sufficient to pay future benefits. The CIA establishes suggested ranges for the level of margins for adverse deviation based on the risk profile of the business. Our margins are set taking into account the risk profile of our business. The effect of these margins is to increase policy liabilities over the best estimate assumptions. The margins for adverse deviation decrease the income that is recognized at the time a new policy is sold and increase the income recognized in later periods as the margins release as the remaining policy risks reduce.

Best Estimate Assumptions

We follow established processes to determine the assumptions used in the valuation of our policy liabilities. The nature of each risk factor and the process for setting the assumptions used in the valuation are discussed below.

Mortality

Mortality relates to the occurrence of death. Mortality assumptions are based on our internal as well as industry past and emerging experience and are differentiated by sex, underwriting class, policy type and geographic market. We make assumptions about future mortality improvements using historical experience derived from population data. Reinsurance is used to offset some of our direct mortality exposure on in-force life insurance policies with the impact of the reinsurance directly reflected in our policy valuation for the determination of policy liabilities net of reinsurance. Actual mortality experience is monitored against these assumptions separately for each business. The results are favourable where mortality rates are lower than assumed for life insurance and where mortality rates are higher than assumed for payout annuities. Overall 2019 experience was unfavourable (2018 – favourable) when compared with our assumptions.

Morbidity

Morbidity relates to the occurrence of accidents and sickness for the insured risks. Morbidity assumptions are based on our internal as well as industry past and emerging experience and are established for each type of morbidity risk and geographic market. For our JH Long Term Care business we make assumptions about future morbidity changes. Actual morbidity experience is monitored against these assumptions separately for each business. Our morbidity risk exposure relates to future expected claims costs for long-term care insurance, as well as for group benefits and certain individual health insurance products we offer. Overall 2019 experience was unfavourable (2018 – unfavourable) when compared with our assumptions.

Policy Termination and Premium Persistency

Policy termination includes lapses and surrenders, where lapses represent the termination of policies due to non-payment of premiums and surrenders represent the voluntary termination of policies by policyholders. Premium persistency represents the level of ongoing deposits on contracts where there is policyholder discretion as to the amount and timing of deposits. Policy termination and premium persistency assumptions are primarily based on our recent experience adjusted for expected future conditions. Assumptions reflect differences by type of contract within each geographic market and actual experience is monitored against these assumptions separately for each business. Overall 2019 experience was unfavourable (2018 – unfavourable) when compared with our assumptions.

Expenses and Taxes

Operating expense assumptions reflect the projected costs of maintaining and servicing in-force policies, including associated overhead expenses. The expenses are derived from internal cost studies and are projected into the future with an allowance for inflation. For some developing businesses, there is an expectation that unit costs will decline as these businesses mature. Actual expenses are monitored against assumptions separately for each business. Overall maintenance expenses for 2019 were unfavourable (2018 – unfavourable) when compared with our assumptions. Taxes reflect assumptions for future premium taxes and other non-income related taxes. For income taxes, policy liabilities are adjusted only for temporary tax timing and permanent tax rate differences on the cash flows available to satisfy policy obligations.

Investment Returns

As noted in the “Risk Management – Market Risk – Asset Liability Management Strategy” section above, our general fund product liabilities are categorized into groups with similar characteristics in order to support them with a specific asset strategy. We seek to align the asset strategy for each group to the premium and benefit pattern, policyholder options and guarantees, and crediting rate strategies of the products they support. The projected cash flows from the assets are combined with projected cash flows from future asset purchases/sales to determine expected rates of return for future years. The investment strategies for future asset purchases and sales are based on our target investment policies for each segment and the reinvestment returns are derived from current and projected market rates for fixed interest investments and our projected outlook for non-fixed interest assets. Credit losses are projected based on our own and industry experience, as well as specific reviews of the current investment portfolio. Investment return assumptions for each asset class also incorporate expected investment management expenses that are derived from internal cost studies. In 2019, actual investment returns were unfavourable (2018 – favourable) when compared with our assumptions. Investment-related experience and the direct impact of interest rates and equity markets are discussed in the “Financial Performance” section above.

Segregated Funds

We offer segregated funds to policyholders that offer certain guarantees, including guaranteed returns of principal on maturity or death, as well as guarantees of minimum withdrawal amounts or income benefits. The on-balance sheet liability for these benefits is the expected cost of these guarantees including appropriate valuation margins for the various contingencies including mortality and lapse. The dominant driver of the cost of guarantees is the return on the underlying funds in which the policyholders invest. See “Risk Management – Market Risk – Hedging Strategies for Variable Annuity and Other Equity Risks” and the “Financial Performance – Analysis of Net Income” sections above.

Foreign Currency

Foreign currency risk results from a mismatch of the currency of the policy liabilities and the currency of the assets designated to support these obligations. We generally match the currency of our assets with the currency of the liabilities they support, with the objective of mitigating the risk of economic loss arising from movements in currency exchange rates. Where a currency mismatch exists, the assumed rate of return on the assets supporting the liabilities is reduced to reflect the potential for adverse movements in exchange rates.

Experience Adjusted Products

Where policies have features that allow the impact of changes in experience to be passed on to policyholders through policy dividends, experience rating refunds, credited rates or other adjustable features, the projected policyholder benefits are adjusted to reflect the projected experience. Minimum contractual guarantees and other market considerations are taken into account in determining the policy adjustments.

Provision for Adverse Deviation

The total provision for adverse deviation is the sum of the provisions for adverse deviation for each risk factor. Margins for adverse deviation are established by product type and geographic market for each assumption or factor used in the determination of the best estimate actuarial liability. The margins are established based on the risk characteristics of the business being valued.

Margins for interest rate risk are included by testing a number of scenarios of future interest rates. The margin can be established by testing a limited number of scenarios, some of which are prescribed by Canadian Actuarial Standards of Practice, and determining the liability based on the worst outcome. Alternatively, the margin can be set by testing many scenarios, which are developed according to actuarial guidance. Under this approach the liability would be the average of the outcomes above a percentile in the range prescribed by the Canadian Actuarial Standards of Practice.

In addition to the explicit margin for adverse deviation, the valuation basis for segregated fund liabilities explicitly limits the future revenue recognition in the valuation basis to the amount necessary to offset acquisition expenses, after allowing for the cost of any guarantee features. The fees that are in excess of this limitation are reported as an additional margin and are shown in segregated fund non-capitalized margins.

The provision for adverse deviation and the future revenue deferred in the valuation due to the limitations on recognition of future revenue in the valuation of segregated fund liabilities are shown in the table below.

As at December 31, (\$ millions)	2019	2018
Best estimate actuarial liability	\$ 246,105	\$ 226,128
Provision for adverse deviation ("PfAD")		
Insurance risks (mortality/morbidity)	\$ 18,147	\$ 19,021
Policyholder behaviour (lapse/surrender/premium persistency)	6,010	5,776
Expenses	1,688	1,573
Investment risks (non-credit)	29,650	25,955
Investment risks (credit)	1,061	941
Segregated funds guarantees	1,940	2,184
Total PfAD⁽¹⁾	58,496	55,450
Segregated funds – additional margins	13,680	13,097
Total of PfAD and additional segregated fund margins	\$ 72,176	\$ 68,547

⁽¹⁾ Reported net actuarial liabilities (excluding the \$5,031 million (2018 – \$5,514 million) reinsurance asset related to the Company's in-force participating life insurance closed block that is retained on a funds withheld basis as part of the New York Life transaction) as at December 31, 2019 of \$304,601 million (2018 – \$281,578 million) are comprised of \$246,105 million (2018 – \$226,128 million) of best estimate actuarial liabilities and \$58,496 million (2018 – \$55,450 million) of PfAD.

The change in the PfAD from period to period is impacted by changes in liability and asset composition, by currency and interest rate movements and by material changes in valuation assumptions. The overall decrease in PfADs for insurance risks was primarily due to the annual review of actuarial valuation methods and assumptions, as well as the appreciation of the Canadian dollar relative to the U.S. dollar, Hong Kong dollar and Japanese yen, partially offset by the impact of lower interest rates in the U.S. and Canada, as well as the expected PfAD growth from in-force and new business. The overall increase in PfADs for policyholder behaviour and expense was driven by the impact of lower interest rates in the U.S. and Canada and the expected PfAD growth from in-force and new business, partially offset by the appreciation of the Canadian dollar. The overall increase in PfADs for non-credit investment risks was driven by the expected PfAD growth from in-force and new business, lower interest rates in the U.S. and Canada, and the annual review of actuarial valuation methods and assumptions, partially offset by the appreciation of the Canadian dollar. The increase in the additional segregated fund margins was primarily due to increases in equity markets and declines in interest rates in the U.S.

b. Sensitivity of Earnings to Changes in Assumptions

When the assumptions underlying our determination of policy liabilities are updated to reflect recent and emerging experience or change in outlook, the result is a change in the value of policy liabilities which in turn affects net income attributed to shareholders. The sensitivity of net income attributed to shareholders to changes in non-economic and certain asset related assumptions underlying policy liabilities is shown below and assumes that there is a simultaneous change in the assumptions across all business units. The sensitivity of net income attributed to shareholders to a deterioration or improvement in non-economic assumptions underlying long-term care policy liabilities as at December 31, 2019 is also shown below.

For changes in asset related assumptions, the sensitivity is shown net of the corresponding impact on income of the change in the value of the assets supporting liabilities. In practice, experience for each assumption will frequently vary by geographic market and business, and assumption updates are made on a business/geographic specific basis. Actual results can differ materially from these estimates for a variety of reasons including the interaction among these factors when more than one changes, changes in actuarial and investment return and future investment activity assumptions, actual experience differing from the assumptions, changes in business mix, effective tax rates and other market factors, and the general limitations of our internal models.

Potential impact on net income attributed to shareholders arising from changes to non-economic assumptions⁽¹⁾

As at December 31, (\$ millions)	Decrease in net income attributed to shareholders	
	2019	2018
Policy related assumptions		
2% adverse change in future mortality rates ^{(2),(4)}		
Products where an increase in rates increases insurance contract liabilities	\$ (500)	\$ (500)
Products where a decrease in rates increases insurance contract liabilities	(500)	(500)
5% adverse change in future morbidity rates (incidence and termination) ^{(3),(4),(5)}	(5,100)	(4,800)
10% adverse change in future termination rates ⁽⁴⁾	(2,400)	(2,200)
5% increase in future expense levels	(600)	(600)

⁽¹⁾ The participating policy funds are largely self-supporting and generate no material impact on net income attributed to shareholders as a result of changes in non-economic assumptions. Experience gains or losses would generally result in changes to future dividends, with no direct impact to shareholders.

⁽²⁾ An increase in mortality rates will generally increase policy liabilities for life insurance contracts whereas a decrease in mortality rates will generally increase policy liabilities for policies with longevity risk such as payout annuities.

- (3) No amounts related to morbidity risk are included for policies where the policy liability provides only for claims costs expected over a short period, generally less than one year, such as Group Life and Health.
- (4) The impacts of the sensitivities on LTC for morbidity, mortality and lapse do not assume any partial offsets from the Company's ability to contractually raise premium rates in such events, subject to state regulatory approval. In practice, we would plan to file for rate increases equal to the amount of deterioration resulting from the sensitivity.
- (5) This includes a 5% deterioration in incidence rates and 5% deterioration in claim termination rates.

Potential impact on net income attributed to shareholders arising from changes to non-economic assumptions for Long Term Care⁽¹⁾

As at December 31, (\$ millions)	Decrease in net income attributed to shareholders	
	2019	2018
Policy related assumptions		
2% change in future mortality rates ^{(2),(3)}	\$ (300)	\$ (200)
5% change in future morbidity incidence rates ^{(2),(3)}	(2,500)	(1,700)
5% change in future morbidity claims termination rates ^{(2),(3)}	(2,200)	(2,800)
10% change in future policy termination rates ^{(2),(3)}	(400)	(400)
5% increase in future expense levels ⁽³⁾	(100)	(100)

(1) Translated from US\$ at 1.2988 for 2019.

(2) The impacts of the sensitivities on LTC for morbidity, mortality and lapse do not assume any partial offsets from the Company's ability to contractually raise premium rates in such events, subject to state regulatory approval. In practice, we would plan to file for rate increases equal to the amount of deterioration resulting from the sensitivities.

(3) The impact of favourable changes to all the sensitivities is relatively symmetrical.

Potential impact on net income attributed to shareholders arising from changes to asset related assumptions supporting actuarial liabilities⁽¹⁾

As at December 31, (\$ millions)	Increase (decrease) in net income attributed to shareholders			
	2019		2018	
	Increase	Decrease	Increase	Decrease
Asset related assumptions updated periodically in valuation basis changes				
100 basis point change in future annual returns for public equities ⁽¹⁾	\$ 500	\$ (500)	\$ 500	\$ (500)
100 basis point change in future annual returns for ALDA ⁽²⁾	3,800	(4,400)	3,500	(3,900)
100 basis point change in equity volatility assumption for stochastic segregated fund modelling ⁽³⁾	(300)	300	(300)	300

(1) The sensitivity to public equity returns above includes the impact on both segregated fund guarantee reserves and on other policy liabilities. Expected long-term annual market growth assumptions for public equities are based on long-term historical observed experience and compliance with actuarial standards. As at December 31, 2019, the growth rates inclusive of dividends in the major markets used in the stochastic valuation models for valuing segregated fund guarantees are 9.2% (9.3% – December 31, 2018) per annum in Canada, 9.6% (9.6% – December 31, 2018) per annum in the U.S. and 6.2% (6.2% – December 31, 2018) per annum in Japan. Growth assumptions for European equity funds are market-specific and vary between 8.3% and 9.9%.

(2) ALDA include commercial real estate, timber, farmland, direct oil and gas properties, and private equities, some of which relate to oil and gas. Expected long-term return assumptions for ALDA and public equity are set in accordance with the Standards of Practice for the valuation of insurance contract liabilities and guidance published by the CIA. Annual best estimate return assumptions for ALDA and public equity include market growth rates and annual income, such as rent, production proceeds and dividends, and will vary based on our holding period. Over a 20-year horizon, our best estimate return assumptions range between 5.25% and 11.65%, with an average of 9.3% (9.5% – December 31, 2018) based on the current asset mix backing our guaranteed insurance and annuity business as of December 31, 2019. Our return assumptions including the margins for adverse deviations in our valuation, which take into account the uncertainty of achieving the returns, range between 2.5% and 7.5%, with an average of 6.1% (6.3% – December 31, 2018) based on the asset mix backing our guaranteed insurance and annuity business as of December 31, 2019. The impact from a 100 basis point change increased from December 31, 2018 as the changes in actuarial methods and assumptions, outlined above, resulted in a lengthening of the policy liability cash flows, a portion of which are assumed to be supported by ALDA investments.

(3) Volatility assumptions for public equities are based on long-term historical observed experience and compliance with actuarial standards. The resulting volatility assumptions are 16.5% per annum in Canada and 17.15% per annum in the U.S. for large cap public equities, and 19.25% per annum in Japan. For European equity funds, the volatility varies between 16.5% and 18.4%.

c. Review of Actuarial Methods and Assumptions

A comprehensive review of actuarial methods and assumptions is performed annually. The review is designed to reduce the Company's exposure to uncertainty by ensuring assumptions for both asset related and liability related risks remain appropriate. This is accomplished by monitoring experience and selecting assumptions which represent a current best estimate view of expected future experience, and margins that are appropriate for the risks assumed. While the assumptions selected represent the Company's current best estimates and assessment of risk, the ongoing monitoring of experience and changes in the economic environment are likely to result in future changes to the actuarial assumptions, which could be material.

2019 Review of Actuarial Methods and Assumptions

The 2019 full year review of actuarial methods and assumptions resulted in an increase in insurance contract liabilities of \$74 million, net of reinsurance, and a decrease in net income attributed to shareholders of \$21 million post-tax.

For the year ended December 31, 2019 (\$ millions)	Change in insurance contract liabilities, net of reinsurance			Change in net income attributed to shareholders (post-tax)
	Total	Attributed to participating policyholders' account	Attributed to shareholders' account	
Long-term care triennial review	\$ 11	\$ –	\$ 11	\$ (8)
Mortality and morbidity updates	25	47	(22)	14
Lapses and policyholder behaviour	135	17	118	(75)
Investment return assumptions	12	81	(69)	70
Other updates	(109)	(163)	54	(22)
Net impact	\$ 74	\$ (18)	\$ 92	\$ (21)

Long-term care triennial review

U.S. Insurance completed a comprehensive long-term care (“LTC”) experience study. The review included all aspects of claim assumptions, the impact of policyholder benefit reductions as well as the progress on future premium rate increases and a review of margins on the business. The impact of the LTC review was approximately net neutral to net income attributed to shareholders.

The experience study showed lower termination rates than expected during the elimination or “qualifying” period (which is the period between when a claim is filed and when benefit payments begin), and favourable incidence as policyholders are filing claims at a lower rate than expected. In addition, policyholders are electing to reduce their benefits in lieu of paying increased premiums. The overall claims experience review led to a post-tax charge to net income attributed to shareholders of approximately \$1.9 billion (US\$1.4 billion), which includes a gain of approximately \$0.2 billion (US\$0.16 billion) for the impact of benefit reductions.

The experience study included additional claims data due to the natural aging of the block of business. As a result, we reduced certain margins for adverse deviations, which resulted in a post-tax gain to net income attributed to shareholders of approximately \$0.7 billion (US\$0.5 billion).

While the study continues to support the assumptions of both future morbidity and mortality improvement, we reduced our morbidity improvement assumption, which resulted in a post-tax charge to net income attributed to shareholders of approximately \$0.7 billion (US\$0.5 billion).¹

The review of premium increases assumed in the policy liabilities resulted in a post-tax gain to net income attributed to shareholders of approximately \$2.0 billion (US\$1.5 billion) related to the expected timing and amount of premium increases that are subject to state approval and reflects a 30% provision for adverse deviation. The expected premium increases are informed by past approval rates applied to prior state filings that remain outstanding and estimated new requests based on our 2019 review of morbidity, mortality and lapse assumptions. Our actual experience in obtaining premium increases could be materially different than what we have assumed, resulting in further increases or decreases in policy liabilities, which could be material.²

Updates to mortality and morbidity assumptions

Mortality and morbidity updates resulted in a \$14 million post-tax gain to net income attributed to shareholders. This included a review of our Canada Individual Insurance mortality and reinsurance arrangements.

Updates to lapses and policyholder behaviour

Updates to lapses and policyholder behaviour assumptions resulted in a \$75 million post-tax charge to net income attributed to shareholders.

The primary driver of the charge was an update to our lapse assumptions across several term and whole life product lines within our Canada Individual Insurance business, partially offset by several updates to lapse and premium persistency assumptions in other geographies.

Updates to investment return assumptions

Updates to investment return assumptions resulted in a \$70 million post-tax gain to net income attributed to shareholders.

The primary driver of the gain was an update to our senior secured loan default rates to reflect recent experience, as well as our investment and crediting rate strategy for certain universal life products. This was partially offset by updates to certain private equity investment assumptions in Canada.

Other updates

Other updates resulted in a \$22 million post-tax charge to net income attributed to shareholders.

¹ The padded morbidity assumption is 0.25% for 25 years (down from 0.45%) and unpadded morbidity improvement assumption is 0.50% to age 100 (down from 0.75%).

² See “Caution regarding forward-looking statements” above.

Impact of changes in actuarial methods and assumptions by segment

The impact of changes in actuarial methods and assumptions in Canada was a post-tax charge to net income attributed to shareholders of \$108 million. This charge was driven by updates to lapse rates for certain products within Canada Individual Insurance and updates to certain private equity investment assumptions. In the U.S., we recorded a post-tax gain to net income attributed to shareholders of \$71 million, driven primarily by updates to senior secured loan default rates. In addition, several modelling refinements netted to a positive impact. Updates to assumptions in Asia segment and Corporate and Other segment (which includes our Reinsurance business) resulted in a post-tax gain of \$16 million.

2018 Review of Actuarial Methods and Assumptions

The 2018 full year review of actuarial methods and assumptions resulted in a decrease in insurance contract liabilities of \$174 million, net of reinsurance, and a decrease in net income attributed to shareholders of \$51 million post-tax.

For the year ended December 31, 2018 (\$ millions)	Change in insurance contract liabilities, net of reinsurance			Change in net income attributed to shareholders (post-tax)
	Total	Attributed to participating policyholders' account	Attributed to shareholders' account	
Mortality and morbidity updates	\$ 319	\$ (192)	\$ 511	\$ (360)
Lapses and policyholder behaviour	287	–	287	(226)
Investment return assumptions	(96)	50	(146)	143
Other updates	(684)	(94)	(590)	392
Net impact	\$ (174)	\$ (236)	\$ 62	\$ (51)

Updates to mortality and morbidity assumptions

Mortality and morbidity updates resulted in a \$360 million post-tax charge to net income attributed to shareholders.

The primary driver of the charge is related to updates to mortality and morbidity assumptions for the Company's structured settlement and term renewal business in Canada. A review of mortality assumptions for the Company's U.S. group pension annuity business and certain blocks of its U.S. life insurance business resulted in a small charge to earnings, and other updates to mortality and morbidity assumptions led to a small net charge.

Updates to lapses and policyholder behaviour

Lapse and policyholder behaviour updates resulted in a \$226 million post-tax charge to net income attributed to shareholders.

The primary driver of the charge is related to updated lapse and premium persistency rates for certain U.S. life insurance product lines (\$252 million post-tax charge). This included updates to universal life no-lapse guarantee and business lapse assumptions to better reflect emerging experience which showed a variation in lapses based on premium funding levels, partially offset by favourable lapse experience on several of the U.S. life insurance product lines.

Other updates to lapse and policyholder behaviour assumptions were made across several product lines to reflect recent experience.

Updates to investment return assumptions

Investment return assumption updates resulted in a \$143 million post-tax gain to net income attributed to shareholders.

We updated our bond default rates to reflect recent experience, leading to a \$401 million post-tax gain and updated our investment return assumptions for ALDA and public equities, specifically oil and gas, which led to a \$210 million post-tax charge. Other refinements to the projections of investment returns resulted in a \$48 million post-tax charge.

Other updates

Refinements to the projection of our tax and liability cashflows across multiple product lines led to a post-tax gain to net income attributed to shareholders of \$392 million. The refinements were primarily driven by the projection of tax cashflows as we reviewed the deductibility of certain reserves. In addition, we refined the projection of policyholder crediting rates for certain products.

Impact of changes in actuarial methods and assumptions by segment

The impact of changes in actuarial methods and assumptions in Canada was a post-tax charge to net income attributed to shareholders of \$370 million. This charge was driven by updates to oil and gas investment return assumptions and updates to mortality and morbidity assumptions for our structured settlement and term renewal businesses. In the U.S., we recorded a post-tax gain of \$286 million, driven by updates to our bond default rates and refinements to the projection of our tax and liability cashflows, partially offset by updates to policyholder behaviour assumptions in JH Life. Updates to assumptions in Asia and Reinsurance resulted in a post-tax gain of \$33 million.

d. Change in net insurance contract liabilities

The change in net insurance contract liabilities can be attributed to several sources: new business, acquisitions, in-force movement and currency impact. Changes in net insurance contract liabilities are substantially offset in the financial statements by premiums,

investment income, policy benefits and other policy related cash flows. The changes in net insurance contract liabilities by business segment are shown below:

2019 Net Insurance Contract Liability Movement Analysis

For the year ended December 31, 2019 (\$ millions)	Corporate and Other				Total
	Asia	Canada	U.S.	Corporate and Other	
Balance, January 1	\$ 76,127	\$ 76,628	\$ 133,142	\$ (168)	\$ 285,729
New business ^{(1),(2)}	2,996	(227)	482	–	3,251
In-force movement ^{(1),(3)}	12,079	6,770	12,163	(91)	30,921
Changes in methods and assumptions ⁽¹⁾	60	133	(84)	(35)	74
Currency impact ⁽⁴⁾	(3,325)	(7)	(6,844)	9	(10,167)
Balance, December 31	\$ 87,937	\$ 83,297	\$ 138,859	\$ (285)	\$ 309,808

⁽¹⁾ The \$32,458 million increase reported as the change in insurance contract liabilities and change in reinsurance assets on the 2019 Consolidated Statements of Income primarily consists of changes due to the changes in methods and assumptions, normal in-force movement and new policies. These three items net to an increase of \$34,246 million, of which \$33,497 million is included in the income statement increase in insurance contract liabilities and change in reinsurance assets, and a \$751 million increase is included in net claims and benefits. The Consolidated Statements of Income change in insurance contract liabilities also includes the change in embedded derivatives associated with insurance contracts. Of the \$34,172 million net increase in insurance contract liabilities related to new business and in-force movement, \$33,423 million was an increase in actuarial liabilities. The remaining amount was an increase of \$751 million in other insurance contract liabilities.

⁽²⁾ New business policy liability impact is positive/(negative) when estimated future premiums, together with future investment income, are expected to be more/(less) than sufficient to pay estimated future benefits, policyholder dividends and refunds, taxes (excluding income taxes) and expenses on new policies issued.

⁽³⁾ The net in-force movement over the year was an increase of \$30,921 million, primarily reflecting the impact of interest rate declines and expected growth in insurance contract liabilities in all three insurance segments.

⁽⁴⁾ The decrease in policy liabilities from currency impact reflects the appreciation of the Canadian dollar relative to the U.S. dollar, Hong Kong dollar and Japanese yen. To the extent assets are currency matched to liabilities, the increase in insurance contract liabilities due to currency impact is offset by a corresponding increase from currency impact in the value of assets supporting those liabilities.

2018 Net Insurance Contract Liability Movement Analysis

For the year ended December 31, 2018 (\$ millions)	Corporate and Other				Total
	Asia	Canada	U.S.	Corporate and Other	
Balance, January 1	\$ 62,243	\$ 76,198	\$ 135,851	\$ (46)	\$ 274,246
New business ^{(1),(2)}	3,400	(100)	(31)	–	3,269
In-force movement ^{(1),(3)}	5,117	344	(2,330)	(102)	3,029
Changes in methods and assumptions ⁽¹⁾	52	178	(397)	(7)	(174)
Reinsurance transactions ⁽¹⁾	–	–	(11,156)	–	(11,156)
Currency impact ⁽⁴⁾	5,315	8	11,205	(13)	16,515
Balance, December 31	\$ 76,127	\$ 76,628	\$ 133,142	\$ (168)	\$ 285,729

⁽¹⁾ The \$6,826 million decrease reported as the change in insurance contract liabilities and change in reinsurance assets on the 2018 Consolidated Statements of Income primarily consists of changes due to the reinsurance transactions and changes in methods and assumptions, partially offset by normal in-force movement and new policies. These four items net to a decrease of \$5,032 million, of which \$6,017 million is included in the income statement increase in insurance contract liabilities and change in reinsurance assets, and a \$985 million increase is included in net claims and benefits. The Consolidated Statements of Income change in insurance contract liabilities also includes the change in embedded derivatives associated with insurance contracts. Of the \$6,298 million net increase in insurance contract liabilities related to new business and in-force movement, \$5,313 million was an increase in actuarial liabilities. The remaining amount was an increase of \$985 million in other insurance contract liabilities.

⁽²⁾ New business policy liability impact is positive/(negative) when estimated future premiums, together with future investment income, are expected to be more/(less) than sufficient to pay estimated future benefits, policyholder dividends and refunds, taxes (excluding income taxes) and expenses on new policies issued.

⁽³⁾ The net in-force movement over the year was an increase of \$3,029 million, reflecting expected growth in insurance contract liabilities in all three insurance segments. Expected growth in insurance contract liabilities in the U.S. was offset by the impact of market and yield curve movements during the year.

⁽⁴⁾ The increase in policy liabilities from currency impact reflects the depreciation of the Canadian dollar relative to the U.S. dollar, Hong Kong dollar and Japanese yen. To the extent assets are currency matched to liabilities, the increase in insurance contract liabilities due to currency impact is offset by a corresponding increase from currency impact in the value of assets supporting those liabilities.

e. Critical Accounting Policies

Consolidation

The Company is required to consolidate the financial position and results of entities it controls. Control exists when the Company:

- Has the power to govern the financial and operating policies of the entity;
- Is exposed to a significant portion of the entity's variable returns; and
- Is able to use its power to influence variable returns from the entity.

The Company uses the same principles to assess control over any entity it is involved with. In evaluating control, potential factors assessed include the effects of:

- Substantive potential voting rights that are currently exercisable or convertible;
- Contractual management relationships with the entity;
- Rights and obligations resulting from policyholders to manage investments on their behalf; and
- The effect of any legal or contractual restraints on the Company from using its power to affect its variable returns from the entity.

An assessment of control is based on arrangements in place and the assessed risk exposures at inception. Initial evaluations are reconsidered at a later date if:

- The Company acquires additional interests in the entity or its interests in an entity are diluted;
- The contractual arrangements of the entity are amended such that the Company's involvement with the entity changes; or
- The Company's ability to use its power to affect its variable returns from the entity changes.

Subsidiaries are consolidated from the date on which control is obtained by the Company and cease to be consolidated from the date that control ceases.

Fair Value of Invested Assets

A large portion of the Company's invested assets are recorded at fair value. Refer to note 1 of the 2019 Annual Consolidated Financial Statements for a description of the methods used in determining fair values. When quoted prices in active markets are not available for a particular investment, significant judgment is required to determine an estimated fair value based on market standard valuation methodologies including discounted cash flow methodologies, matrix pricing, consensus pricing services, or other similar techniques. The inputs to these market standard valuation methodologies include: current interest rates or yields for similar instruments, credit rating of the issuer or counterparty, industry sector of the issuer, coupon rate, call provisions, sinking fund requirements, tenor (or expected tenor) of the instrument, management's assumptions regarding liquidity, volatilities and estimated future cash flows. Accordingly, the estimated fair values are based on available market information and management's judgments about the key market factors impacting these financial instruments. Financial markets are susceptible to severe events evidenced by rapid depreciation in asset values accompanied by a reduction in asset liquidity. The Company's ability to sell assets, or the price ultimately realized for these assets, depends upon the demand and liquidity in the market and increases the use of judgment in determining the estimated fair value of certain assets.

Evaluation of Invested Asset Impairment

AFS fixed income and equity securities are carried at fair market value, with changes in fair value recorded in other comprehensive income ("OCI") with the exception of unrealized gains and losses on foreign currency translation of AFS fixed income securities which are included in net income attributed to shareholders. Securities are reviewed on a regular basis and any fair value decrement is transferred out of AOCI and recorded in net income attributed to shareholders when it is deemed probable that the Company will not be able to collect all amounts due according to the contractual terms of a fixed income security or when fair value of an equity security has declined significantly below cost or for a prolonged period of time.

Provisions for impairments of mortgage loans and private placement loans are recorded with losses reported in earnings when there is no longer reasonable assurance as to the timely collection of the full amount of the principal and interest.

Significant judgment is required in assessing whether an impairment has occurred and in assessing fair values and recoverable values. Key matters considered include economic factors, Company and industry specific developments, and specific issues with respect to single issuers and borrowers.

Changes in circumstances may cause future assessments of asset impairment to be materially different from current assessments, which could require additional provisions for impairment. Additional information on the process and methodology for determining the allowance for credit losses is included in the discussion of credit risk in note 9 to the 2019 Consolidated Financial Statements.

Derivative Financial Instruments

The Company uses derivative financial instruments ("derivatives") including swaps, forwards and futures agreements, and options to help manage current and anticipated exposures to changes in interest rates, foreign exchange rates, commodity prices and equity market prices, and to replicate permissible investments. Refer to note 4 to the 2019 Consolidated Financial Statements for a description of the methods used to determine the fair value of derivatives.

The accounting for derivatives is complex and interpretations of the primary accounting guidance continue to evolve in practice. Judgment is applied in determining the availability and application of hedge accounting designations and the appropriate accounting treatment under such accounting guidance. Differences in judgment as to the availability and application of hedge accounting designations and the appropriate accounting treatment may result in a differing impact on the Consolidated Financial Statements of the Company from that previously reported. Assessments of hedge effectiveness and measurements of ineffectiveness of hedging relationships are also subject to interpretations and estimations. If it was determined that hedge accounting designations were not appropriately applied, reported net income attributed to shareholders could be materially affected.

Employee Future Benefits

The Company maintains defined contribution and defined benefit pension plans and other post-employment plans for employees and agents, including registered (tax qualified) pension plans that are typically funded, as well as supplemental non-registered (non-qualified) pension plans for executives, retiree welfare plans and disability welfare plans that are typically not funded. The largest defined benefit pension and retiree welfare plans in the U.S. and Canada are the material plans that are discussed herein and in note 16 to the 2019 Annual Consolidated Financial Statements.

Due to the long-term nature of defined benefit pension and retiree welfare plans, the calculation of the defined benefit obligation and net benefit cost depends on various assumptions such as discount rates, salary increase rates, cash balance interest crediting rates, health care cost trend rates and rates of mortality. These assumptions are determined by management and are reviewed annually. The key assumptions, as well as the sensitivity of the defined benefit obligation to changes in these assumptions, are presented in note 16 to the 2019 Annual Consolidated Financial Statements.

Changes in assumptions and differences between actual and expected experience give rise to actuarial gains and losses that affect the amount of the defined benefit obligation and OCI. For 2019, the amount recorded in OCI was a gain of \$113 million (2018 – gain of \$109 million) for the defined benefit pension plans and a loss of \$21 million (2018 – loss of \$48 million) for the retiree welfare plans.

Contributions to the registered (tax qualified) defined benefit pension plans are made in accordance with the applicable U.S. and Canadian regulations. During 2019, the Company contributed \$13 million (2018 – \$23 million) to these plans. As at December 31, 2019, the difference between the fair value of assets and the defined benefit obligation for these plans was a surplus of \$394 million (2018 – surplus of \$257 million). For 2020, the contributions to the plans are expected to be approximately \$11 million.¹

The Company's supplemental pension plans for executives are not funded; benefits under these plans are paid as they become due. During 2019, the Company paid benefits of \$62 million (2018 – \$56 million) under these plans. As at December 31, 2019, the defined benefit obligation for these plans, which is reflected as a liability in the balance sheet, amounted to \$758 million (2018 – \$742 million).

The Company's retiree welfare plans are partially funded, although there are no regulations or laws governing or requiring the funding of these plans. As at December 31, 2019, the difference between the fair value of plan assets and the defined benefit obligation for these plans was a deficit of \$47 million (2018 – deficit of \$30 million).

Income Taxes

The Company is subject to income tax laws in various jurisdictions. Tax laws are complex and potentially subject to different interpretations by the taxpayer and the relevant tax authority. The provision for income taxes represents management's interpretation of the relevant tax laws and its estimate of current and future income tax implications of the transactions and events during the period. A deferred tax asset or liability results from temporary differences between carrying values of the assets and liabilities and their respective tax basis. Deferred tax assets and liabilities are recorded based on expected future tax rates and management's assumptions regarding the expected timing of the reversal of such temporary differences. The realization of deferred tax assets depends upon the existence of sufficient taxable income within the carryback or carry forward periods under the tax law in the applicable tax jurisdiction. A deferred tax asset is recognized to the extent that future realization of the tax benefit is probable. Deferred tax assets are reviewed at each reporting date and are reduced to the extent that it is no longer probable that the tax benefit will be realized. At December 31, 2019, we had \$4,574 million of deferred tax assets (December 31, 2018 – \$4,318 million). Factors in management's determination include, among other things, the following:

- Future taxable income exclusive of reversing temporary differences and carry forwards;
- Future reversals of existing taxable temporary differences;
- Taxable income in prior carryback years; and
- Tax planning strategies.

The Company may be required to change its provision for income taxes if the ultimate deductibility of certain items is successfully challenged by taxing authorities or if estimates used in determining the amount of deferred tax assets to recognize change significantly, or when receipt of new information indicates the need for adjustment in the recognition of deferred tax assets. Additionally, future events, such as changes in tax laws, tax regulations, or interpretations of such laws or regulations, could have an impact on the provision for income tax, deferred tax balances, actuarial liabilities (see Critical Actuarial and Accounting Policies – Expenses and Taxes above) and the effective tax rate. Any such changes could significantly affect the amounts reported in the Consolidated Financial Statements in the year these changes occur.

Goodwill and Intangible Assets

At December 31, 2019, under IFRS we had \$5,743 million of goodwill and \$4,232 million of intangible assets (\$1,584 million of which are intangible assets with indefinite lives). Goodwill and intangible assets with indefinite lives are tested at the cash generating unit level ("CGU") or group of CGUs level. A CGU comprises the smallest group of assets that are capable of generating largely independent cash flows and is either a business segment or a level below. The tests performed in 2019 demonstrated that there was no impairment of goodwill or intangible assets with indefinite lives. Changes in discount rates and cash flow projections used in the determination of embedded values or reductions in market-based earnings multiples may result in impairment charges in the future, which could be material.

Impairment charges could occur in the future as a result of changes in economic conditions. The goodwill testing for 2020 will be updated based on the conditions that exist in 2020 and may result in impairment charges, which could be material.

f. Future Accounting and Reporting Changes

There are several new accounting and reporting changes issued under IFRS including those still under development by the IASB. We have summarized below key recently issued accounting standards that are anticipated to have a significant impact on the Company. Accounting and reporting changes are discussed in note 2 of the 2019 Consolidated Financial Statements.

IFRS 9 "Financial Instruments"

IFRS 9 "Financial Instruments" was issued in November 2009 and amended in October 2010, November 2013 and July 2014, and is effective for years beginning on or after January 1, 2018, to be applied retrospectively, or on a modified retrospective basis. Additionally, the IASB issued amendments in October 2017 that are effective for annual periods beginning on or after January 1, 2019. The standard is intended to replace IAS 39 "Financial Instruments: Recognition and Measurement".

¹ See "Caution regarding forward-looking statements" above.

The project has been divided into three phases: classification and measurement, impairment of financial assets, and hedge accounting. IFRS 9's current classification and measurement methodology provides that financial assets are measured at either amortized cost or fair value on the basis of the entity's business model for managing the financial assets and the contractual cash flow characteristics of the financial assets. The classification and measurement for financial liabilities remains generally unchanged; however, for a financial liability designated as at fair value through profit or loss, revisions have been made in the accounting for changes in fair value attributable to changes in the credit risk of that liability. Gains or losses caused by changes in an entity's own credit risk on such liabilities are no longer recognized in profit or loss but instead are reflected in OCI.

Revisions to hedge accounting were issued in November 2013 as part of the overall IFRS 9 project. The amendment introduces a new hedge accounting model, together with corresponding disclosures about risk management activity for those applying hedge accounting. The new model represents a substantial overhaul of hedge accounting that will enable entities to better reflect their risk management activities in their financial statements.

Revisions issued in July 2014 replace the existing incurred loss model used for measuring the allowance for credit losses with an expected loss model. Changes were also made to the existing classification and measurement model designed primarily to address specific application issues raised by early adopters of the standard. They also address the income statement accounting mismatches and short-term volatility issues which have been identified as a result of the insurance contracts project.

The Company elected to defer IFRS 9 until January 1, 2021 as allowed under the amendments to IFRS 4 "Insurance Contracts". The Company is assessing the impact of this standard.

In June 2019, the exposure draft published for IFRS 17 proposed to extend the deferral date of IFRS 9 by one year to January 1, 2022. Effective dates for both standards have previously been aligned and any further deferrals for IFRS 17 could influence the effective date for IFRS 9 as well.

IFRS 17 "Insurance Contracts"

IFRS 17 was issued in May 2017 and is effective for years beginning on January 1, 2021, to be applied retrospectively. If full retrospective application to a group of contracts is impractical, the modified retrospective or fair value methods may be used. The standard will replace IFRS 4 "Insurance Contracts" and will materially change the recognition and measurement of insurance contracts and the corresponding presentation and disclosures in the Company's Financial Statements.

In June 2019, the IASB issued an exposure draft with a number of proposed targeted amendments for public consultation. The proposed amendments include a deferral of the effective date of IFRS 17 by one year, to January 1, 2022. The proposed amendments are subject to IASB's redeliberation process which is expected to conclude in mid-2020. IASB is additionally taking into consideration a deferral beyond 2022. The Company will continue to monitor IASB's future developments related to IFRS 17.

The principles underlying IFRS 17 differ from the CALM as permitted by IFRS 4. While there are many differences, the following outlines two of the key differences:

- Under IFRS 17 the discount rate used to estimate the present value of insurance contract liabilities is based on the characteristics of the liability, whereas under CALM, the Company uses the rates of returns for current and projected assets supporting insurance contract liabilities to value the liabilities. The difference in the discount rate approach also impacts the timing of investment-related experience earnings emergence. Under CALM, investment-related experience includes the impact of investing activities. The impact of investing activities is directly related to the CALM methodology. Under IFRS 17 the impact of investing activities will emerge over the life of the asset.
- Under IFRS 17 new business gains are recorded on the Consolidated Statements of Financial Position (in the contractual service margin component of the insurance contract liability) and amortized into income as services are provided. Under CALM new business gains (and losses) are recognized in income immediately.

The Company is assessing the implications of this standard including proposed amendments and expects that it will have a significant impact on the Company's Consolidated Financial Statements. In addition, in certain jurisdictions, including Canada, it could have a material effect on tax and regulatory capital positions and other financial metrics that are dependent upon IFRS accounting values. A summary of some of the key risks are outlined in the "Risk Management – Emerging Risks" section above.

11. Risk Factors

Our insurance, wealth and asset management and other financial services businesses subject Manulife to a broad range of risks. Management has identified the following risks and uncertainties to which our businesses, operations and financial condition are subject. The risks and uncertainties described below are not the only ones facing us. Additional risks not presently known to us or that we currently deem immaterial could also impair our businesses, operations and financial condition. If any of such risks should occur, the trading price of our securities, including common shares, preferred shares and debt securities, could decline, and you may lose all or part of your investment.

a. Strategic Risk Factors

We operate in highly competitive markets and compete for customers with both insurance and non-insurance financial services companies. Customer loyalty and retention, and access to distributors, are important to the Company's success and are influenced by many factors, including our distribution practices and regulations, product features, service levels, prices, and our financial strength ratings and reputation.

We may not be successful in executing our business strategies or these strategies may not achieve our objectives.

- Refer to "Risk Management – Strategic Risk" above.
- The economic environment could be volatile and our regulatory environment will continue to evolve, potentially with higher capital requirements which could materially impact our competitiveness. Further, the attractiveness of our product offerings relative to our competitors will be influenced by competitor actions as well as our own, and the requirements of the applicable regulatory regimes. For these and other reasons, there is no certainty that we will be successful in implementing our business strategies or that these strategies will achieve the objectives we target.
- Macro-economic factors may result in our inability to achieve business strategies and plans. Of note, economic factors such as flat or declining equity markets, equity market volatility, or a period of prolonged low interest rates could impact our ability to achieve business objectives. Other factors, such as management actions taken to bolster capital and manage the Company's risk profile, including new or amended reinsurance agreements, and additional actions that the Company may take to help manage near-term regulatory capital ratios or help mitigate equity market and interest rate exposures, could adversely impact our longer-term earnings potential.

Our businesses are heavily regulated, and changes in regulation or laws, or in the interpretation or enforcement of regulation and laws, may reduce our profitability and limit our growth.

- Our insurance operations are subject to a wide variety of insurance and other laws and regulations. Insurance and securities regulators in Canada, the United States, Asia and other jurisdictions regularly re-examine existing laws and regulations applicable to insurance companies, investment advisors, brokers-dealers and their products. Compliance with applicable laws and regulations is time consuming and personnel-intensive, and changes in these laws and regulations or in the interpretation or enforcement thereof, may materially increase our direct and indirect compliance costs and other expenses of doing business, thus having a material adverse effect on our results of operations and financial condition.
- In addition, international regulators as well as domestic financial authorities and regulators in many countries have been reviewing their capital requirements and are implementing, or are considering implementing, changes aimed at strengthening risk management and capitalization of financial institutions. Future regulatory capital, actuarial and accounting changes, including changes with a retroactive impact, could have a material adverse effect on the Company's consolidated financial condition, results of operations and regulatory capital both on transition and going forward. In addition, such changes could have a material adverse effect on the Company's position relative to that of other Canadian and international financial institutions with which Manulife competes for business and capital.
- In Canada, MFC and its principal operating subsidiary, MLI, are governed by the Insurance Companies Act (Canada) ("ICA"). The ICA is administered, and the activities of the Company are supervised, by the Office of the Superintendent of Financial Institutions ("OSFI"). MLI is also subject to regulation and supervision under the insurance laws of each of the provinces and territories of Canada. Regulatory oversight is vested in various governmental agencies having broad administrative power with respect to, among other things, dividend payments, capital adequacy and risk based capital requirements, asset and reserve valuation requirements, permitted investments and the sale and marketing of insurance contracts. These regulations are intended to protect policyholders and beneficiaries rather than investors and may adversely impact shareholder value.
- Some recent examples of regulatory and professional standard developments, in addition to the developments outlined in the "Risk Management – Regulatory Updates" section above, which could impact our net income attributed to shareholders and/or capital position are provided below.
 - At its annual meeting in November 2019, the International Association of Insurance Supervisors ("IAIS") adopted its first global frameworks for supervision of internationally active insurance groups ("IAIGs") and mitigation of systemic risk in the insurance sector. The framework was composed of three elements:
 - A Common Framework (ComFrame) provides supervisory standards and guidance focusing on the effective group-wide supervision of IAIGs. ComFrame builds on the revised set of Insurance Core Principles ("ICPs"), that are applicable to the supervision of all insurers, and which were adopted after extensive review.
 - A risk based global Insurance Capital Standard ("ICS") is being further developed over a five-year monitoring period beginning in 2020. While broadly supportive of the goals of ICS, OSFI stated that they did not support the ICS design for

the monitoring period, citing that it was ‘not fit for purpose for the Canadian market’. The adoption of the international rules in specific markets or on a group-based basis will depend on the decision of each applicable regulator.

- The Holistic Framework for the assessment and mitigation of systemic risk in the insurance sector, which includes reviewing activities of insurers, will be used beginning in January 2020. At the same time, the Financial Standards Board announced it would be suspending designations of any IAIGs as Globally Systemically Important Insurers (G-SIIs) until at least November 2022 when it will re-assess whether designations are necessary.

Though the overall frameworks have been adopted, much of the necessary details remain to be developed. Manulife is an IAIG but is not designated as a G-SII. The impact on capital and other regulatory requirements and Manulife’s competitive position remains unknown and is being monitored.

- The National Association of Insurance Commissioners (“NAIC”) has been reviewing reserving and capital methodologies as well as the overall risk management framework. These reviews will affect U.S. life insurers, including John Hancock, and could lead to increased reserving and/or capital requirements for our business in the U.S. In addition, the NAIC is continuing to explore the development of a group capital calculation tool; the scope of any such tool has not yet been determined.
- The Actuarial Standards Board (“ASB”) promulgates certain assumptions referenced in the CIA Standards of Practice for the valuation of insurance contract liabilities. These promulgations are updated periodically and, in the event that new promulgations are published, they will apply to the determination of actuarial liabilities and may lead to an increase in actuarial liabilities and a reduction in net income attributed to shareholders.
- In the United States, state insurance laws regulate most aspects of our business, and our U.S. insurance subsidiaries are regulated by the insurance departments of the states in which they are domiciled and the states in which they are licensed. State laws grant insurance regulatory authorities broad administrative powers with respect to, among other things: licensing companies and agents to transact business; calculating the value of assets to determine compliance with statutory requirements; mandating certain insurance benefits; regulating certain premium rates; reviewing and approving policy forms; regulating unfair trade and claims practices, including through the imposition of restrictions on marketing and sales practices, distribution arrangements and payment of inducements; regulating advertising; protecting privacy; establishing statutory capital and reserve requirements and solvency standards; fixing maximum interest rates on insurance policy loans and minimum rates for guaranteed crediting rates on life insurance policies and annuity contracts; approving changes in control of insurance companies; restricting the payment of dividends and other transactions between affiliates; and regulating the types, amounts and valuation of investments. Changes in any such laws and regulations, or in the interpretation or enforcement thereof by regulators, could significantly affect our business, results of operations and financial condition.
- Currently, the U.S. federal government does not directly regulate the business of insurance. However, federal legislation and administrative policies in several areas can significantly and adversely affect state regulated insurance companies. These areas include financial services regulation, securities regulation, pension regulation, privacy, tort reform legislation and taxation. In addition, under the Dodd-Frank Wall Street Reform and Consumer Protection Act (“Dodd-Frank”), the U.S. Board of Governors of the Federal Reserve has supervisory powers over non-bank financial companies that are determined to be systemically important.
- Insurance guaranty associations in Canada and the United States have the right to assess insurance companies doing business in their jurisdiction for funds to help pay the obligations of insolvent insurance companies to policyholders and claimants. Because the amount and timing of an assessment is beyond our control, the liabilities that we have currently established for these potential liabilities may not be adequate.
- While many of the laws and regulations to which we are subject are intended to protect policyholders, beneficiaries, depositors and investors in our products and services, others also set standards and requirements for the governance of our operations. Failure to comply with applicable laws or regulations could result in financial penalties or sanctions, and damage our reputation.
- All aspects of Manulife’s Global Wealth Management businesses are subject to various laws and regulations around the world. These laws and regulations are primarily intended to protect investment advisory clients, investors in registered and unregistered funds, and clients of Manulife’s global retirement businesses. For example, in Canada, the Canadian Securities Administrators have established a set of best interest principles which are intended to ensure investment advisors put their client’s interests first when providing financial advice. Agencies that regulate investment advisors, investment funds and retirement plan products and services have broad administrative powers, including the power to limit, restrict or prohibit the regulated entity or person from carrying on business if it fails to comply with such laws and regulations. Possible sanctions for significant compliance failures include the suspension of individual employees, limitations on engaging in certain lines of business for specified periods of time, revocation of investment advisor and other registrations and censures and fines both for individuals and Manulife.
- From time to time, regulators raise issues during examinations or audits of Manulife that could have a material adverse impact on us. We cannot predict whether or when regulatory actions may be taken that could adversely affect our operations. Our failure to comply with existing and evolving regulatory requirements could also result in regulatory sanctions and could affect our relationships with regulatory authorities and our ability to execute our business strategies and plans. For further discussion of government regulation and legal proceedings refer to “Government Regulation” in MFC’s Annual Information Form dated February 12, 2019 and note 18 of the 2019 Annual Consolidated Financial Statements. Refer to the risk factor “Our non-North American operations face political, legal, operational and other risks that could negatively affect those operations or our results of operations and financial condition” for further discussion on the impact to our operations.

International Financial Reporting Standards will have a material impact on our financial results.

- Accounting standards and our policies are essential to understanding our results of operations and financial condition and new standards or modifications to existing standards could have a material adverse impact on our financial results and regulatory capital

position (the regulatory capital framework in Canada uses IFRS as a base). Additionally, any mismatch between the underlying economics of our business and new accounting standards could have significant unintended negative consequences on our business model; and potentially affect our customers, shareholders and our access to capital markets.

Changes in tax laws, tax regulations, or interpretations of such laws or regulations could make some of our products less attractive to consumers, could increase our corporate taxes or cause us to change the value of our deferred tax assets and liabilities as well as our tax assumptions included in the valuation of our policy liabilities. This could have a material adverse effect on our business, results of operations and financial condition.

- Many of the products that the Company sells benefit from one or more forms of preferred tax treatment under current income tax regimes. For example, the Company sells life insurance policies that benefit from the deferral or elimination of taxation on earnings accrued under the policy, as well as permanent exclusion of certain death benefits that may be paid to policyholders' beneficiaries. We also sell annuity contracts that allow the policyholders to defer the recognition of taxable income earned within the contract. Other products that the Company sells, such as certain employer-paid health and dental plans, also enjoy similar, as well as other, types of tax advantages. The Company also benefits from certain tax benefits, including tax-exempt interest, dividends-received deductions, tax credits (such as foreign tax credits), and favourable tax rates and/or income measurement rules for tax purposes.
- There is risk that tax legislation could be enacted that would lessen or eliminate some or all of the tax advantages currently benefiting the Company or its policyholders or its other clients. This could occur in the context of deficit reduction or other tax reforms. The effects of any such changes could result in materially lower product sales, lapses of policies currently held, and/or our incurrence of materially higher corporate taxes, any of which could have a material adverse effect on our business, results of operations and financial condition.
- Additionally, the Company may be required to change its provision for income taxes or carrying amount of deferred tax assets or liabilities if the characterization of certain items is successfully challenged by taxing authorities or if future transactions or events, which could include changes in tax laws, tax regulations or interpretations of such laws or regulations, occur. Any such changes could significantly affect the amounts reported in the Consolidated Financial Statements in the year these changes occur.
- The U.S. government enacted the Tax Cuts and Jobs Act effective January 1, 2018 ("U.S. Tax Reform"). The legislation makes broad and complex changes to the U.S. tax code including reducing individual and corporate tax rates and permitting expensing of many capital expenditures, increasing and extending the amortization period on policy acquisition costs, and further limiting the deductibility of policy reserves for U.S. federal income tax purposes. Regulations and further guidance from the Internal Revenue Service and other bodies continue to be developed and released, implementing and/or clarifying the legislation. Any further changes or amendments to the law or its interpretation could result in material change to our tax balances.
- In the long run, U.S. Tax Reform, all else being equal, could lead to a reduction in corporate borrowings and lower borrowings could lead to tighter spreads.

Access to capital may be negatively impacted by market conditions.

- Disruptions, uncertainty or volatility in the financial markets may limit our access to the capital markets to raise capital required to operate our business. Such market conditions may limit our ability to access the capital necessary to satisfy regulatory capital requirements to grow our business and meet our refinancing requirements. Under extreme conditions, we may be forced, among other things, to delay raising capital, issue different types of capital than we would otherwise under normal conditions, less effectively deploy such capital, issue shorter term securities than we prefer, or issue securities that bear an unattractive cost of capital which could decrease our financial flexibility, profitability, and/or dilute our existing shareholders.

As a holding company, MFC depends on the ability of its subsidiaries to transfer funds to it to meet MFC's obligations and pay dividends. Subsidiaries' remittance of capital depends on subsidiaries' earnings, regulatory requirements and restrictions, and macroeconomic conditions.

- MFC is a holding company and relies on dividends and interest payments from our insurance and other subsidiaries as the principal source of cash flow to meet MFC's obligations and pay dividends. As a result, MFC's cash flows and ability to service its obligations are dependent upon the earnings of its subsidiaries and the distribution of those earnings and other funds by its subsidiaries to MFC. Substantially all of MFC's business is currently conducted through its subsidiaries.
- The ability of our holding company to fund its cash requirements depends upon it receiving dividends, distributions and other payments from our operating subsidiaries. The ability of MFC's insurance subsidiaries to pay dividends to MFC in the future will depend on their earnings, regulatory requirements and restrictions, and macroeconomic conditions.
- MFC's insurance subsidiaries are subject to a variety of insurance and other laws and regulations that vary by jurisdiction and are intended to protect policyholders and beneficiaries in that jurisdiction first and foremost, rather than investors. These subsidiaries are generally required to maintain solvency and capital standards as set by their local regulators and may also be subject to other regulatory restrictions, all of which may limit the ability of subsidiary companies to pay dividends or make distributions to MFC.
- Potential changes to regulatory capital and actuarial and accounting standards could also limit the ability of the insurance subsidiaries to pay dividends or make distributions and could have a material adverse effect on internal capital mobility. We may be required to raise additional capital, which could be dilutive to existing shareholders, or to limit the new business we write, or to pursue actions that would support capital needs but adversely impact our subsequent earnings potential. In addition, the timing and outcome of these initiatives could have a significantly adverse impact on our competitive position relative to that of other Canadian and international financial institutions with which we compete for business and capital.
- The Company seeks to maintain capital in its insurance subsidiaries in excess of the minimum required in all jurisdictions in which the Company does business. The minimum requirements in each jurisdiction may increase due to regulatory changes and we may

decide to maintain additional capital in our operating subsidiaries to fund expected growth of the business or to deal with changes in the risk profile of such subsidiaries. Any such increases in the level of capital may reduce the ability of the operating companies to pay dividends.

- The payment of dividends to MFC by MLI is subject to restrictions set out in the ICA. The ICA prohibits the declaration or payment of any dividend on shares of an insurance company if there are reasonable grounds for believing: (i) the company does not have adequate capital and adequate and appropriate forms of liquidity; or (ii) the declaration or the payment of the dividend would cause the company to be in contravention of any regulation made under the ICA respecting the maintenance of adequate capital and adequate and appropriate forms of liquidity, or of any direction made to the company by the Superintendent. All of our U.S. and Asian operating life insurance companies are subsidiaries of MLI. Accordingly, a restriction on dividends from MLI would restrict MFC's ability to obtain dividends from its U.S. and Asian businesses.
- Certain of MFC's U.S. insurance subsidiaries also are subject to insurance laws in Michigan, New York and Massachusetts, the jurisdictions in which these subsidiaries are domiciled, which impose general limitations on the payment of dividends and other upstream distributions by these subsidiaries to MLI.
- Our Asian insurance subsidiaries are also subject to restrictions in the jurisdictions in which these subsidiaries are domiciled which could affect their ability to pay dividends to MLI in certain circumstances.

We may experience future downgrades in our financial strength or credit ratings, which may materially adversely impact our financial condition and results of operations.

- Credit rating agencies publish financial strength ratings on life insurance companies that are indicators of an insurance company's ability to meet contract holder and policyholder obligations. Credit rating agencies also assign credit ratings, which are indicators of an issuer's ability to meet the terms of its obligations in a timely manner and are important factors in a company's overall funding profile and ability to access external capital. Ratings reflect the views held by each credit agency, which are subject to change based on various factors that may be within or beyond a company's control.
- Ratings are important factors in establishing the competitive position of insurance companies, maintaining public confidence in products being offered, and determining the cost of capital. A ratings downgrade, or the potential for such a downgrade could adversely affect our operations and financial condition. A downgrade could, among other things, increase our cost of capital and limit our access to the capital markets; cause some of our existing liabilities to be subject to acceleration, additional collateral support, changes in terms, or additional financial obligations; result in the termination of our relationships with broker-dealers, banks, agents, wholesalers and other distributors of our products and services; increase our cost of hedging; unfavourably impact our ability to execute on our hedging strategies; materially increase the number of surrenders, for all or a portion of the net cash values, by the owners of policies and contracts we have issued, impact our ability to obtain reinsurance at reasonable prices or at all, and materially increase the number of withdrawals by policyholders of cash values from their policies; and reduce new sales.

Competitive factors may adversely affect our market share and profitability.

- The insurance, wealth and asset management industries are highly competitive. Our competitors include other insurers, securities firms, investment advisors, mutual funds, banks and other financial institutions. The rapid advancement of new technologies, such as blockchain, artificial intelligence and advanced analytics, may enable other non-traditional firms to compete directly in the industry space, or offer services to our traditional competitors to enhance their value propositions. The impact from technological disruption may result in our competitors improving their customer experience, product offerings and business costs. Our competitors compete with us for customers, access to distribution channels such as brokers and independent agents, and for employees. In some cases, competitors may be subject to less onerous regulatory requirements, have lower operating costs or have the ability to absorb greater risk while maintaining their financial strength ratings, thereby allowing them to price their products more competitively or offer features that make their products more attractive. These competitive pressures could result in lower new business volumes and increased pricing pressures on a number of our products and services that may harm our ability to maintain or increase our profitability. Because of the highly competitive nature of the financial services industry, there can be no assurance that we will continue to effectively compete with our traditional and non-traditional industry rivals, and competitive pressure may have a material adverse effect on our business, results of operations and financial condition.

We may experience difficulty in marketing and distributing products through our current and future distribution channels.

- We distribute our insurance and wealth management products through a variety of distribution channels, including brokers, independent agents, broker-dealers, banks, wholesalers, affinity partners, other third-party organizations and our own sales force in Asia. We generate a significant portion of our business through individual third-party arrangements. We periodically negotiate provisions and renewals of these relationships, and there can be no assurance that such terms will remain acceptable to us or relevant third parties. An interruption in our continuing relationship with certain of these third parties could significantly affect our ability to market our products and could have a material adverse effect on our business, results of operations and financial condition.

Industry trends could adversely affect the profitability of our businesses.

- Our business segments continue to be influenced by a variety of trends that affect our business and the financial services industry in general. The impact of the volatility and instability of the financial markets on our business is difficult to predict and the results of operations and our financial condition may be significantly impacted by general business and economic trends in the geographies in which we operate. These conditions include market factors, such as public equity, foreign currency, interest rate and other market

risks, as well as demographic shifts, consumer behaviours (e.g. spending habits and debt levels), governmental policies (e.g. fiscal, monetary, global trade), and other factors. The Company's business plans, financial condition and results of operations have been in the recent past and may in the future be negatively impacted or affected.

We may face unforeseen liabilities or asset impairments arising from possible acquisitions and dispositions of businesses or difficulties integrating acquired businesses.

- We have engaged in acquisitions and dispositions of businesses in the past and expect to continue to do so in the future as we may deem appropriate. There could be unforeseen liabilities or asset impairments, including goodwill impairments that arise in connection with the businesses that we may sell, have acquired, or may acquire in the future. In addition, there may be liabilities or asset impairments that we fail, or are unable, to discover in the course of performing due diligence investigations on acquisition targets. Furthermore, the use of our own funds as consideration in any acquisition would consume capital resources that would no longer be available for other corporate purposes.
- Our ability to achieve some or all of the benefits we anticipate from any acquisitions of businesses will depend in large part upon our ability to successfully integrate the businesses in an efficient and effective manner. We may not be able to integrate the businesses smoothly or successfully, and the process may take longer than expected. The integration of operations may require the dedication of significant management resources, which may distract management's attention from our day-to-day business. Acquisitions of operations outside of North America, especially any acquisition in a jurisdiction in which we do not currently operate, may be particularly challenging or costly to integrate. If we are unable to successfully integrate the operations of any acquired businesses, we may be unable to realize the benefits we expect to achieve as a result of the acquisitions and the results of operations may be less than expected.

If our businesses do not perform well, or if the outlook for our businesses is significantly lower than historical trends, we may be required to recognize an impairment of goodwill or intangible assets or to establish a valuation allowance against our deferred tax assets, which could have a material adverse effect on our results of operations and financial condition.

- Goodwill represents the excess of the amounts we paid to acquire subsidiaries and other businesses over the fair value of their net identifiable assets at the date of acquisition. Intangible assets represent assets that are separately identifiable at the time of an acquisition and provide future benefits such as the John Hancock brand.
- As outlined above, in section "Critical Actuarial and Accounting Policies – Goodwill and Intangible Assets", goodwill and intangible assets with indefinite lives are tested at least annually for impairment at the cash generating unit ("CGU") or group of CGUs level, representing the smallest group of assets that is capable of generating largely independent cash flows. Going forward, as a result of the impact of economic conditions and changes in product mix and the granular level of goodwill testing under IFRS, additional impairment charges could occur in the future. Any impairment in goodwill would not affect LICAT capital.
- If market conditions deteriorate in the future and, in particular, if MFC's common share price is low relative to book value per share, if the Company's actions to limit risk associated with its products or investments cause a significant change in any one CGU's recoverable amount, or if the outlook for a CGU's results deteriorate, the Company may need to reassess the value of goodwill and/or intangible assets which could result in impairments during 2020 or subsequent periods. Such impairments could have a material adverse effect on our results of operations and financial condition.
- Deferred income tax balances represent the expected future tax effects of the differences between the book and tax basis of assets and liabilities, loss carry forwards and tax credits. Deferred tax assets are recorded when the Company expects to claim deductions on tax returns in the future for expenses that have already been recorded in the financial statements.
- The availability of those deductions is dependent on future taxable income against which the deductions can be made. Deferred tax assets are assessed periodically by management to determine if they are realizable. Factors in management's determination include the performance of the business including the ability to generate gains from a variety of sources and tax planning strategies. If based on information available at the time of the assessment, it is determined that the deferred tax asset will not be realized, then the deferred tax asset is reduced to the extent that it is no longer probable that the tax benefit will be realized.

We may not be able to protect our intellectual property and may be subject to infringement claims.

- We rely on a combination of contractual rights and copyright, trademark, patent and trade secret laws to establish and protect our intellectual property. In particular, we have invested considerable resources in promoting the brand names "Manulife" and "John Hancock" and expect to continue to do so. Although we use a broad range of measures to protect our intellectual property rights, third parties may infringe or misappropriate our intellectual property. We may have to litigate to enforce and protect our copyrights, trademarks, patents, trade secrets and know-how or to determine their scope, validity or enforceability, which represents a diversion of resources that may be significant in amount and may not prove successful. The loss of intellectual property protection or the inability to secure or enforce the protection of our intellectual property assets could have a material adverse effect on our business and our ability to compete.
- We also may be subject to costly litigation in the event that another party alleges our operations or activities infringe upon its intellectual property rights. Third parties may have, or may eventually be issued, patents that could be infringed by our products, methods, processes or services. Any party that holds such a patent could make a claim of infringement against us. We may also be subject to claims by third parties for breach of copyright, trademark, trade secret or license usage rights. Any such claims and any resulting litigation could result in significant liability for damages. If we were found to have infringed a third-party patent or other intellectual property rights, we could incur substantial liability, and in some circumstances could be enjoined from providing certain products or services to our customers or utilizing and benefiting from certain methods, processes, copyrights, trademarks, trade

secrets or licenses, or alternatively could be required to enter into costly licensing arrangements with third parties, all of which could have a material adverse effect on our business, results of operations and financial condition.

Applicable laws may discourage takeovers and business combinations that common shareholders of MFC might consider in their best interests.

- The ICA contains restrictions on the purchase or other acquisition, issue, transfer and voting of the shares of an insurance company. In addition, under applicable U.S. insurance laws and regulations in states where certain of our insurance company subsidiaries are domiciled, no person may acquire control of MFC without obtaining prior approval of those states' insurance regulatory authorities. These restrictions may delay, defer, prevent, or render more difficult a takeover attempt that common shareholders of MFC might consider in their best interests. For instance, they may prevent shareholders of MFC from receiving the benefit from any premium to the market price of MFC's common shares offered by a bidder in a takeover context. Even in the absence of a takeover attempt, the existence of these provisions may adversely affect the prevailing market price of MFC's common shares if they are viewed as discouraging takeover attempts in the future.

Entities within the MFC Group are interconnected which may make separation difficult.

- MFC operates in local markets through subsidiaries and branches of subsidiaries. These local operations are financially and operationally interconnected to lessen expenses, share and reduce risk, and efficiently utilize financial resources. In general, external capital required for companies in the Manulife group has been raised at the MFC or MLI level and then transferred to other entities as equity or debt capital as appropriate. Other linkages include policyholder and other creditor guarantees and other forms of internal support between various entities, loans, capital maintenance agreements, derivatives, shared services and affiliate reinsurance treaties. Accordingly, the risks undertaken by a subsidiary may be transferred to or shared by affiliates through financial and operational linkages. Some of the consequences of this are:
 - Financial difficulties at a subsidiary may not be isolated and could cause material adverse effects on affiliates and the group as a whole.
 - Linkages may make it difficult to dispose of or separate a subsidiary or business within the group by way of a spin-off or similar transaction and the disposition or separation of a subsidiary or business may not fully eliminate the liability of the Company and its remaining subsidiaries for shared risks. Issues raised by such a transaction could include: (i) the Company cannot terminate, without policyholder consent and in certain jurisdictions regulator consent, parental guarantees on in-force policies and therefore would continue to have residual risk under any such non-terminated guarantees; (ii) internal capital mobility and efficiency could be limited; (iii) significant potential tax consequences; (iv) uncertainty about the accounting and regulatory outcomes of such a transaction; (v) obtaining any other required approvals; (vi) there may be a requirement for significant capital injections; and (vii) the transaction may result in increased sensitivity of net income attributed to shareholders and capital of MFC and its remaining subsidiaries to market declines.

b. Market Risk Factors

Market risk is the risk of loss resulting from market price volatility, interest rate change, credit and swap spread changes, and from adverse foreign currency rate movements. Market price volatility primarily relates to changes in prices of publicly traded equities and alternative long-duration assets. The profitability of our insurance and annuity products, as well as the fees we earn in our investment management business, are subject to market risk.

Our most significant source of publicly traded equity risk arises from equity-linked products with guarantees, where the guarantees are linked to the performance of the underlying funds.

- Publicly traded equity performance risk arises from a variety of sources, including guarantees associated with equity-linked investments such as variable annuity and segregated fund products, general fund investments in publicly traded equities and mutual funds backing general fund product liabilities.
- Market conditions resulting in reductions in the asset value we manage has an adverse effect on the revenues and profitability of our investment management business, which depends on fees related primarily to the values of assets under management and administration.
- Guaranteed benefits of Variable Annuity and Segregated Funds are contingent and payable upon death, maturity, permitted withdrawal or annuitization. If equity markets decline or even if they increase by an amount lower than that assumed in our actuarial valuation, additional liabilities may need to be established to cover the contingent liabilities, resulting in a reduction in net income attributed to shareholders and regulatory capital ratios. Further, if equity markets do not recover to the amount of the guarantees, by the dates the liabilities are due, the accrued liabilities will need to be paid out in cash. In addition, sustained flat or declining public equity markets would likely reduce asset-based fee revenues related to variable annuities and segregated funds with guarantees and related to other wealth and insurance products.
- Where publicly traded equity investments are used to support general fund product liabilities, the policy valuation incorporates projected investment returns on these assets. If actual returns are lower than the expected returns, the investment losses will reduce net income attributed to shareholders.
- For products where the investment strategy applied to future cash flows in the policy valuation includes investing a specified portion of future cash flows in publicly traded equities, a decline in the value of publicly traded equities relative to other assets could require us to change the investment mix assumed for future cash flows, which may increase policy liabilities and reduce net income attributed to shareholders. A reduction in the outlook for expected future returns for publicly traded equities, which could result

from a fundamental change in future expected economic growth, would increase policy liabilities and reduce net income attributed to shareholders. Furthermore, to the extent publicly traded equities are held as Available For Sale, other than temporary impairments that arise will reduce income.

- Expected long-term annual market growth assumptions for public equities for key markets are based on long-term historical observed experience. See Critical Actuarial and Accounting Policies for the rates used in the stochastic valuation of our segregated fund guarantee business. The calibration of the economic scenario generators that are used to value segregated fund guarantee business complies with current CIA Standards of Practice for the valuation of these products. Implicit margins, determined through stochastic valuation processes, lower net yields used to establish policy liabilities. Assumptions used for public equities backing liabilities are also developed based on historical experience but are constrained by different CIA Standards of Practice and differ slightly from those used in stochastic valuation. Alternative asset return assumptions vary based on asset class but are largely consistent, after application of valuation margins and differences in taxation, with returns assumed for public equities.

We experience interest rate and spread risk within the general fund primarily due to the uncertainty of future returns on investments.

- Interest rate and spread risk arises from general fund guaranteed benefit products, general fund adjustable benefit products with minimum rate guarantees, general fund products with guaranteed surrender values, segregated fund products with minimum benefit guarantees and from surplus fixed income investments. The risk arises within the general fund primarily due to the uncertainty of future returns on investments to be made as assets mature and as recurring premiums are received and invested or reinvested to support longer dated liabilities. Interest rate risk also arises due to minimum rate guarantees and guaranteed surrender values on products where investment returns are generally passed through to policyholders. A rapid rise in interest rates may also result in losses attributable to early liquidation of fixed income instruments supporting contractual surrender benefits, if customers surrender to take advantage of higher interest rates on offer elsewhere. In contrast, in a lower interest rate environment, borrowers may prepay or redeem fixed income securities, mortgages and loans with greater frequency in order to borrow at lower market rates, potentially reducing the returns on our investment portfolio, if there are no make whole conditions. Substantially all our fixed income securities, mortgages and loans portfolio include make whole conditions.
- The valuation of policy liabilities reflects assumptions for the yield on future investments and the projected cash flows associated with interest rate hedges. A general decline in interest rates, without a change in corporate bond spreads and swap spreads, will reduce the assumed yield on future investments but favourably impact the value of lengthening interest rate hedges. Conversely, a general increase in interest rates, without a change in corporate bond spreads and swap spreads, will increase the assumed yield on future investments, but unfavourably impact the value of lengthening interest rate hedges. The Company's disclosed estimated impact from interest rate movements reflects a parallel increase and decrease in interest rates of specific amounts. The reinvestment assumptions used in the valuation of our insurance liabilities are based on interest rate scenarios and calibration criteria set by the Actuarial Standards Board, while our interest rate hedges are valued using current market interest rates. Therefore, in any particular quarter, changes to the reinvestment assumptions are not fully aligned to changes in current market interest rates especially when there is a significant change in the shape of the interest rate curve. As a result, the impact from non-parallel movements may be different from the estimated impact of parallel movements. Furthermore, changes in interest rates could change the reinvestment scenarios used in the calculation of our actuarial liabilities. The reinvestment scenario changes tend to amplify the negative effects of a decrease in interest rates and dampen the positive effects of interest rate increases. In addition, decreases in corporate bond spreads or increases in swap spreads should generally result in an increase in policy liabilities and a reduction in net income attributed to shareholders, while an increase in corporate bond spreads or a decrease in swap spreads should generally have the opposite impact. The impact of changes in interest rates and in spreads may be partially offset by changes to credited rates on adjustable products that pass-through investment returns to policyholders.
- For segregated fund and variable annuity products that contain investment guarantees in the form of benefit guarantees, a sustained increase in interest rate volatility or a decline in interest rates would increase the costs of hedging the benefit guarantees provided. The impact of changes in interest rates are managed within the Variable Annuity dynamic hedging program.

We experience ALDA performance risk when actual returns are lower than expected returns.

- ALDA performance risk arises from general fund investments in commercial real estate, timber properties, farmland properties, infrastructure, oil and gas properties, and private equities.
- Where these assets are used to support policy liabilities, the policy valuation incorporates projected investment returns on these assets. ALDA assumptions vary by asset class and generally have a similar impact on policy liabilities as public equities would. If actual returns are lower than the expected returns, there will be a negative impact to the net income attributed to shareholders. A reduction in the outlook for expected future returns for ALDA, which could result from a variety of factors such as a fundamental change in future expected economic growth or declining risk premiums due to increased competition for such assets, would increase policy liabilities and reduce net income attributed to shareholders. Further, if returns on certain external asset benchmarks used to determine permissible assumed returns under the CIA Standards of Practice are lower than expected, expected future returns will be adjusted accordingly and the Company's policy liabilities will increase, reducing net income attributed to shareholders.
- The value of oil and gas assets could be adversely affected by declines in energy prices as well as by a number of other factors including production declines, uncertainties associated with estimating oil and natural gas reserves, difficult economic conditions and geopolitical events. Changes in government regulation of the oil and gas industry, including environmental regulation, carbon taxes and changes in the royalty rates resulting from provincial royalty reviews, could also adversely affect the value of our oil and gas investments.

- Difficult economic conditions could result in higher vacancy, lower rental rates and lower demand for real estate investments, all of which would adversely impact the value of our real estate investments. Difficult economic conditions could also prevent companies in which we have made private equity investments from achieving their business plans and could cause the value of these investments to fall, or even cause the companies to fail. Declining valuation multiples in the public equity market would also likely cause values to decline in our private equity portfolio. The timing and amount of investment income from private equity investments is difficult to predict, and investment income from these investments can vary from quarter to quarter.
- Our timberland and farmland holdings are exposed to natural risks, such as prolonged drought, wildfires, insects, windstorms, flooding, and climate change. We are generally not insured for these types of risks but seek to mitigate their impact through portfolio diversification and prudent operating practices.
- More broadly, a rising interest rate environment could result in the value of some of our ALDA investments declining, particularly those with fixed contractual cash flows such as real estate.
- The negative impact of changes in these factors can take time to be fully reflected in the valuations of private investments, including ALDA, especially if the change is large and rapid, as market participants adjust their forecasts and better understand the potential medium to long-term impact of such changes. As a result, valuation changes in any given period may reflect the delayed impact of events that occurred in prior periods.
- We rely on a diversified portfolio of ALDA assets to generate relatively stable investment returns. Diversification benefits may be reduced at times, especially during a period of economic stress, which would adversely affect portfolio returns.
- The Company determines investment return assumptions for ALDA in accordance with the Standards of Practice for the valuation of insurance contract liabilities and guidance published by the CIA. The guidance requires that the investment return assumption for these assets should not be higher than the historical long-term average returns of an appropriate broad-based index. Where such experience is not available, the investment return assumption for these assets should not result in a lower reserve than an assumption based on a historical-return benchmark for public equities in the same jurisdiction. As a result, the impact of changes in the historical returns for public equity benchmarks may result in an update to our investment return assumptions for ALDA.

Our liabilities are valued based on an assumed asset investment strategy over the long term.

- We develop an investment strategy for the assets that back our liabilities. The strategy involves making assumptions on the kind of assets in which we will invest and the returns such assets will generate.
- We may not be able to implement our investment strategy as intended due to a lack of assets available at the returns we assume. This may result in a change in investment strategy and/or assumed future returns, thus adversely impacting our financial results.
- From time to time we may decide to adjust our portfolio asset mix which may result in adverse impacts to our financial results for one or more periods.

We experience foreign exchange risk as a substantial portion of our business is transacted in currencies other than Canadian dollars.

- Our financial results are reported in Canadian dollars. A substantial portion of our business is transacted in currencies other than Canadian dollars, mainly U.S. dollars, Hong Kong dollars and Japanese yen. If the Canadian dollar strengthens relative to these currencies, net income attributed to shareholders would decline and our reported shareholders' equity would decline. A weakening of the Canadian dollar against the foreign currencies in which we do business would have the opposite effect and would increase net income attributed to shareholders and shareholders' equity.

The Company's hedging strategies will not fully reduce the market risks related to the product guarantees and fees being hedged, hedging costs may increase and the hedging strategies expose the Company to additional risks.

- Our hedging strategies rely on the execution of derivative transactions in a timely manner. Market conditions can limit availability of hedging instruments, requiring us to post additional collateral, and can further increase the costs of executing derivative transactions. Therefore, hedging costs and the effectiveness of the strategy may be negatively impacted if markets for these instruments become illiquid. The Company is subject to the risk of increased funding and collateral demands which may become significant as equity markets increase.
- The Company is also subject to counterparty risks arising from the derivative instruments and to the risk of increased funding and collateral demands which may become significant as equity markets and interest rates increase. The strategies are highly dependent on complex systems and mathematical models that are subject to error and rely on forward-looking long-term assumptions that may prove inaccurate, and which rely on sophisticated infrastructure and personnel which may fail or be unavailable at critical times. Due to the complexity of the strategies, there may be additional unidentified risks that may negatively impact our business and future financial results. In addition, rising equity markets and interest rates that would otherwise result in profits on variable annuities will be offset by losses from our hedging positions. For further information pertaining to counterparty risks, refer to the risk factor "If a counterparty fails to fulfill its obligations, we may be exposed to risks we had sought to mitigate".
- Under certain market conditions, which include a sustained increase in realized equity and interest rate volatilities, a decline in interest rates, or an increase in the correlation between equity returns and interest rate declines, the costs of hedging the benefit guarantees provided in variable annuities may increase or become uneconomic. In addition, there can be no assurance that our dynamic hedging strategy will fully offset the risks arising from the variable annuities being hedged.
- Policy liabilities and regulatory required capital for variable annuity guarantees are determined using long-term forward-looking estimates of volatilities. These long-term forward-looking volatilities assumed for policy liabilities and required capital meet the CIA and OSFI calibration standards. To the extent that realized equity or interest rate volatilities in any quarter exceed the assumed long-term

volatilities, or correlations between interest rate changes and equity returns are higher, there is a risk that rebalancing will be greater and more frequent, resulting in higher hedging costs.

- The level of guarantee claims returns or other benefits ultimately paid will be impacted by policyholder longevity and policyholder activity including the timing and amount of withdrawals, lapses, fund transfers and contributions. The sensitivity of liability values to equity market and interest rate movements that we hedge are based on long-term expectations for longevity and policyholder activity, since the impact of actual longevity and policyholder experience variances cannot be hedged using capital markets instruments. There is a risk that we may be unable to effectively or economically hedge products which provide for guarantee claims, returns or other benefits.

Changes in market interest rates may impact our net income attributed to shareholders and capital ratios.

- A prolonged low or negative interest rate environment may result in charges related to lower fixed income reinvestment assumptions and an increase in new business strain until products are repositioned for the lower rate environment. Other potential consequences of low interest rates include:
 - Low interest rates could negatively impact sales;
 - Lower risk-free rates tend to increase the cost of hedging, and as a result the offering of guarantees could become uneconomic;
 - The reinvestment of cash flows into low yielding bonds could result in lower future earnings due to lower returns on surplus and general account assets supporting in-force liabilities, and due to guarantees embedded in products including minimum guaranteed rates in participating and adjustable products;
 - A lower interest rate environment could be correlated with other macro-economic factors including unfavourable economic growth and lower returns on other asset classes;
 - Lower interest rates could contribute to potential impairments of goodwill;
 - Lower interest rates could lead to lower mean bond parameters used for the stochastic valuation of segregated fund guarantees, resulting in higher policy liabilities;
 - Lower interest rates would also reduce expected earnings on in-force policies;
 - A prolonged low or negative interest environment may also result in the Actuarial Standards Board lowering the promulgated URR and require us to increase our provisions;
 - Lower interest rates could also trigger a switch to a more adverse prescribed interest stress scenario, increasing LICAT capital. See "LICAT Scenario Switch" above.
 - The difference between the current investable returns and the returns used in pricing new business are generally capitalized when new business is written. Lower interest rates result in higher new business strain until products are re-priced or interest rates increase; and
 - Fixed income reinvestment rates other than the URR are based on current market rates. The net income sensitivity to changes in current rates is outlined in the section "Interest Rate and Spread Risk Sensitivities and Exposure Measures" above.
- A rapid rise in interest rates may also result in losses attributable to early liquidation of fixed income instruments supporting contractual surrender benefits if customers surrender to take advantage of higher interest rates on offer elsewhere.

With the continued production of LIBOR not guaranteed beyond 2021, the transition to alternative reference rates may adversely impact the valuation of our LIBOR-based financial instruments.

- The Company uses London Interbank Offered Rate ("LIBOR") based derivatives for the management of our interest rate risk and is reliant on the continued use of LIBOR as a reference rate in the marketplace. The Chief Executive of the U.K. Financial Conduct Authority ("FCA") has announced that, after 2021, the FCA would no longer use its power to persuade or compel panel banks to submit rate information used to determine LIBOR. To address the increased risk that LIBOR may not exist beyond 2021, public / private sector working groups have been formed in major currency jurisdictions to identify alternative reference rate benchmarks in currencies for which LIBOR is quoted.
- The Federal Reserve Bank of New York has begun publishing a Secured Overnight Financing Rate ("SOFR"), which is intended to replace U.S. dollar LIBOR, and central banks in several other jurisdictions have also announced plans for alternative reference rates for other currencies. At this time, we cannot predict how markets will respond to these new rates, and we cannot predict the effect of any changes to or discontinuation of LIBOR on new or existing financial instruments to which we have exposure.
- Any changes to or discontinuation of LIBOR or change to an alternative reference rate may adversely affect the valuation of our existing interest-rate linked and derivatives securities we hold, the effectiveness of those derivatives in mitigating our risks, securities we have issued, or other asset or liabilities whose value is tied to LIBOR or to a LIBOR alternative. Furthermore, depending on the nature of the alternative reference rate, we may become exposed to additional risks from other aspects of the business, including product design, pricing and models. Any change to or discontinuation of similar benchmark rates besides LIBOR could have similar effects.

c. Liquidity Risk Factors

Liquidity risk, is the risk of not having access to sufficient funds or liquid assets to meet both expected and unexpected cash outflows and collateral demand. We are exposed to liquidity risk in our operating and holding companies. In the operating companies, cash and collateral demands arise day-to-day to fund anticipated policyholder benefits, withdrawals of customer deposit balances, reinsurance settlements, derivative instrument settlements/collateral pledging, expenses, investment and hedging activities. Under stressed conditions, additional cash and collateral demands could arise primarily from changes to policyholders termination or policy renewal

rates, withdrawals of customer deposit balances, borrowers renewing or extending their loans when they mature, derivative settlements or collateral demands, and reinsurance settlements or collateral demands.

Liquidity risk is impacted by various factors, including but not limited to, capital and credit market conditions, re-pricing risk on letters of credit, collateral pledging obligations, and reliance on confidence sensitive deposits.

- Adverse market conditions may significantly affect our liquidity risk.
 - Reduced asset liquidity may restrict our ability to sell certain types of assets for cash without taking significant losses. If providers of credit preserve their capital, our access to borrowing from banks and others or access to other types of credit such as letters of credit, may be reduced. If investors have a negative perception of our creditworthiness, this may reduce access to wholesale borrowing in the debt capital markets or increase borrowing costs.
 - Liquid assets are required to pledge as collateral to support activities such as the use of derivatives for hedging purposes and to cover cash settlement associated with such derivatives.
 - The principal sources of our liquidity are cash and our assets that are readily convertible into cash, including insurance and annuity premiums, fee income earned on AUM, money market securities, and cash flow from our investment portfolio. The issuance of long-term debt, common and preferred shares and other capital securities may also increase our available liquid assets or be required to replace certain maturing or callable liabilities. In the event we seek additional financing, the availability and terms of such financing will depend on a variety of factors including market conditions, the availability of credit to the financial services industry, our credit ratings and credit capacity, as well as the possibility that customers, lenders or investors could develop a negative perception of our long-term or short-term financial prospects if we incur large financial losses or if the level of our business activity decreases due to a significant market downturn.
- Dodd-Frank has increased the number of derivative transactions that must be cleared through regulated clearinghouses and has therefore increased our liquidity risk (as such cleared derivatives are subject to both initial margin and variation margin requirements, and a more restrictive set of eligible collateral than non-cleared derivatives).
 - Over time in-force over the counter derivatives will migrate to clearinghouses, or the Company and its counterparties may have the right to cancel the contract after specific dates or in certain situations such as a ratings downgrade, which could accelerate the transition to clearing houses. As such, this may not become a significant risk for Manulife until a large portion of our derivatives have transitioned to clearinghouses (expected in the 2021 to 2023 timeframe)¹ and market conditions adverse to liquidity (material increases in interest rates and/or equity markets) have been experienced.
 - In addition, variation margin rules for non-cleared derivatives (including eligible collateral restrictions) have further increased our liquidity risk. Initial margin rules for non-cleared derivatives taking effect in September 2020 are also expected to affect our liquidity risk.
- We are exposed to re-pricing risk on letters of credit.
 - In the normal course of business, third-party banks issue letters of credit on our behalf. In lieu of posting collateral, our businesses utilize letters of credit for which third parties are the beneficiaries, as well as for affiliate reinsurance transactions between subsidiaries of MFC. Letters of credit and letters of credit facilities must be renewed periodically. At time of renewal, the Company is exposed to re-pricing risk and under adverse conditions increases in costs may be realized. In the most extreme scenarios, letters of credit capacity could become constrained due to non-renewals which would restrict our flexibility to manage capital. This could negatively impact our ability to meet local capital requirements or our sales of products in jurisdictions in which our operating companies have been affected. As at December 31, 2019, letters of credit for which third parties are beneficiary, in the amount of \$57 million, were outstanding. There were no assets pledged against these outstanding letters of credit as at December 31, 2019.
- Our obligations to pledge collateral or make payments related to declines in value of specified assets may adversely affect our liquidity.
 - In the normal course of business, we are obligated to pledge assets to comply with jurisdictional regulatory and other requirements including collateral pledged in relation to derivative contracts and assets held as collateral for repurchase funding agreements. The amount of collateral we may be required to post under these agreements, and the amount of payments we are required to make to our counterparties, may increase under certain circumstances, including a sustained or continued decline in the value of our derivative contracts. Such additional collateral requirements and payments could have an adverse effect on our liquidity. As at December 31, 2019, total pledged assets were \$5,844 million, compared with \$5,041 million in 2018.
- Our banking subsidiary relies on confidence sensitive deposits and this increases our liquidity risk.
 - Manulife Bank is a wholly owned subsidiary of our Canadian life insurance operating company, MLI. The Bank is principally funded by retail deposits. A real or perceived problem with the Bank or its parent companies could result in a loss of confidence in the Bank's ability to meet its obligations, which in turn may trigger a significant withdrawal of deposit funds. A substantial portion of the Bank's deposits are demand deposits that can be withdrawn at any time, while the majority of the Bank's assets are first residential mortgages in the form of home equity lines of credit, which represent long-term funding obligations. If deposit withdrawal speeds exceed our extreme stress test assumptions the Bank may be forced to sell assets at a loss to third parties or call the home equity lines of credit.

¹ See "Caution regarding forward-looking statements" above.

The declaration and payment of dividends and the amount thereof is subject to change.

- The holders of common shares are entitled to receive dividends as and when declared by the Board of Directors of MFC, subject to the preference of the holders of Class A Shares, Class 1 Shares, Class B Shares (collectively, the “Preferred Shares”) and any other shares ranking senior to the common shares with respect to priority in payment of dividends. The declaration and payment of dividends and the amount thereof is subject to the discretion of the Board of Directors of MFC and is dependent upon the results of operations, financial condition, cash requirements and future prospects of, and regulatory and contractual restrictions on the payment of dividends by MFC and other factors deemed relevant by the Board of Directors of MFC. Although MFC has historically declared quarterly cash dividends on the common shares, MFC is not required to do so and the Board of Directors of MFC may reduce, defer or eliminate MFC’s common share dividend in the future.
- The foregoing risk disclosure in respect of the declaration and payment of dividends on the common shares applies equally in respect of the declaration and payment of dividends on the Preferred Shares, notwithstanding that the Preferred Shares have a fixed rate of dividend.
- See “Government Regulation” and “Dividends” in MFC’s Annual Information Form dated February 12, 2020 for a summary of additional statutory and contractual restrictions concerning the declaration of dividends by MFC.

d. Credit Risk Factors

Worsening regional and global economic conditions or the rise in interest rates could result in borrower or counterparty defaults or downgrades and could lead to increased provisions or impairments related to our general fund invested assets and off-balance sheet derivative financial instruments, and an increase in provisions for future credit impairments to be included in our policy liabilities. Any of our reinsurance providers being unable or unwilling to fulfill their contractual obligations related to the liabilities we cede to them could lead to an increase in policy liabilities.

Our invested assets primarily include investment grade bonds, private placements, commercial mortgages, asset-backed securities, and consumer loans. These assets are generally carried at fair value, but changes in value that arise from a credit-related impairment are recorded as a charge against income. The return assumptions incorporated in actuarial liabilities include an expected level of future asset impairments. There is a risk that actual impairments will exceed the assumed level of impairments in the future and earnings could be adversely impacted.

Volatility may arise from defaults and downgrade charges on our invested assets and as a result, losses could potentially rise above long-term expected levels. Net impaired fixed income assets were \$234 million, representing 0.06% of total general fund invested assets as at December 31, 2019, compared with \$179 million, representing 0.05% of total general fund invested assets as at December 31, 2018.

If a counterparty fails to fulfill its obligations, we may be exposed to risks we had sought to mitigate.

- The Company uses derivative financial instruments to mitigate exposures to public equity, foreign currency, interest rate and other market risks arising from on-balance sheet financial instruments, guarantees related to variable annuity products, selected anticipated transactions and certain other guarantees. The Company may be exposed to counterparty risk if a counterparty fails to pay amounts owed to us or otherwise perform its obligations to us. Counterparty risk increases during economic downturns because the probability of default increases for most counterparties. If any of these counterparties default, we may not be able to recover the amounts due from that counterparty. As at December 31, 2019, the largest single counterparty exposure, without taking into account the impact of master netting agreements or the benefit of collateral held, was \$3,047 million (2018 – \$2,269 million). The net exposure to this counterparty, after taking into account master netting agreements and the fair value of collateral held, was nil (2018 – nil). As at December 31, 2019, the total maximum credit exposure related to derivatives across all counterparties, without taking into account the impact of master netting agreements and the benefit of collateral held, was \$20,144 million (2018 – \$14,320 million) compared with \$67 million after taking into account master netting agreements and the benefit of fair value of collateral held (2018 – \$245 million). The exposure to any counterparty would grow if, upon the counterparty’s default, markets moved such that our derivatives with that counterparty gain in value. Until we are able to replace that derivative with another counterparty, the gain on the derivatives subsequent to the counterparty’s default would not be backed by collateral. The Company reinsures a portion of the business we enter into; however, we remain legally liable for contracts that we had reinsured. In the event that any of our reinsurance providers were unable or unwilling to fulfill their contractual obligations related to the liabilities we cede to them, we would need to increase actuarial reserves, adversely impacting our net income attributed to shareholders and capital position. In addition, the Company has over time sold certain blocks of business to third-party purchasers using reinsurance. To the extent that the reinsured contracts are not subsequently novated to the purchasers, we remain legally liable to the insureds. Should the purchasers be unable or unwilling to fulfill their contractual obligations under the reinsurance agreement, we would need to increase policy liabilities resulting in a charge to net income attributed to shareholders. To reduce credit risk, the Company may require purchasers to provide collateral for their reinsurance liabilities.
- We participate in a securities lending program whereby blocks of securities are loaned to third parties, primarily major brokerage firms and commercial banks. Collateral, which exceeds the market value of the loaned securities, is retained by the Company until the underlying security has been returned. If any of our securities lending counterparties default and the value of the collateral is insufficient, we would incur losses. As at December 31, 2019, the Company had loaned securities (which are included in invested assets) valued at approximately \$558 million, compared with \$1,518 million at December 31, 2018.

The determination of allowances and impairments on our investments is subjective and changes could materially impact our results of operations or financial position.

- The determination of allowances and impairments is based upon a periodic evaluation of known and inherent risks associated with the respective security. Management considers a wide range of factors about the security and uses its best judgment in evaluating the cause of the decline, in estimating the appropriate value for the security and in assessing the prospects for near-term recovery. Inherent in management's evaluation of the security are assumptions and estimates about the operations of the issuer and its future earnings potential. Considerations in the impairment evaluation process include: (i) the severity of the impairment; (ii) the length of time and the extent to which the market value of a security has been below its carrying value; (iii) the financial condition of the issuer; (iv) the potential for impairments in an entire industry sector or sub-sector; (v) the potential for impairments in certain economically depressed geographic locations; (vi) the potential for impairments of securities where the issuer, series of issuers or industry has suffered a catastrophic type of loss or has exhausted natural resources; (vii) our ability and intent to hold the security for a period of time sufficient to allow for the recovery of its value to an amount equal to or greater than cost or amortized cost; (viii) unfavourable changes in forecasted cash flows on mortgage-backed and asset-backed securities; and (ix) other subjective factors, including concentrations and information obtained from regulators and rating agencies.
- Such evaluations and assessments are revised as conditions change and new information becomes available. We update our evaluations regularly and reflect changes in allowances and impairments as such evaluations warrant. The evaluations are inherently subjective and incorporate only those risk factors known to us at the time the evaluation is made. There can be no assurance that management has accurately assessed the level of impairments that have occurred. Additional impairments will likely need to be taken or allowances provided for in the future as conditions evolve. Historical trends may not be indicative of future impairments or allowances.

e. Product Risk Factors

We make a variety of assumptions related to the future level of claims, policyholder behaviour, expenses, reinsurance costs and sales levels when we design and price products, and when we establish policy liabilities. Assumptions for future claims are generally based on both Company and industry experience, and assumptions for future policyholder behaviour and expenses are generally based on Company experience. Assumptions for future policyholder behaviour include assumptions related to the retention rates for insurance and wealth products. Assumptions for expenses include assumptions related to future maintenance expense levels and volume of the business.

Losses may result should actual experience be materially different than that assumed in the valuation of policy liabilities.

- Such losses could have a significant adverse effect on our results of operations and financial condition. In addition, we periodically review the assumptions we make in determining our policy liabilities and the review may result in an increase in policy liabilities and a decrease in net income attributed to shareholders. Such assumptions require significant professional judgment, and actual experience may be materially different than the assumptions we make. (See "Critical Actuarial and Accounting Policies" above.)

We may be unable to implement necessary price increases on our in-force businesses or may face delays in implementation.

- We continue to seek state regulatory approvals for price increases on existing long-term care business in the United States. We cannot be certain whether or when each approval will be granted. For some in-force business regulatory approval for price increases may not be required. However, regulators or policyholders may nonetheless seek to challenge our authority to implement such increases. Our policy liabilities reflect our estimates of the impact of these price increases, but should we be less successful than anticipated in obtaining them, then policy liabilities could increase accordingly and reduce net income attributed to shareholders.

Evolving legislation related to genetic testing could adversely impact our underwriting abilities.

- Current or future legislation in jurisdictions where Manulife operates may restrict its right to underwrite based on access to genetic test results. Without the obligation of disclosure, the asymmetry of information shared between applicant and insurer could increase anti-selection in both new business and in-force policyholder behaviour. The impact of restricting insurers' access to this information and the associated problems of anti-selection becomes more acute where genetic technology leads to advancements in diagnosis of life-threatening conditions that are not matched by improvements in treatment. We cannot predict the potential financial impact that this would have on the Company or the industry as a whole. In addition, there may be further unforeseen implications as genetic testing continues to evolve and becomes more established in mainstream medical practice.

Life and health insurance claims may be impacted unexpectedly by changes in the prevalence of diseases or illnesses, medical and technology advances, widespread lifestyle changes, natural disasters, large-scale human-made disasters and acts of terrorism.

- Claims resulting from catastrophic events could cause substantial volatility in our financial results in any period and could materially reduce our profitability or harm our financial condition. Large-scale catastrophic events may also reduce the overall level of economic activity, which could hurt our business and our ability to write new business. It is possible that geographic concentration of insured individuals, could increase the severity of claims we receive from future catastrophic events. The effectiveness of external parties, including governmental and nongovernmental organizations, in combating the severity of such an event is outside of our control and could have a material impact on the losses we experience.

- The cost of health insurance benefits may be impacted by unforeseen trends in the incidence, termination and severity rates of claims. The ultimate level of lifetime benefits paid to policyholders may be increased by an unexpected increase in life expectancy. For example, advances in technology could lead to longer lives through better medical treatment or better disease prevention. Policyholder behaviour including premium payment patterns, policy renewals, lapse rates and withdrawal and surrender activity are influenced by many factors including market and general economic conditions, and the availability and relative attractiveness of other products in the marketplace. For example, a weak or declining economic environment could increase the value of guarantees associated with variable annuities or other embedded guarantees and contribute to adverse policyholder behaviour experience, or a rapid rise in interest rates could increase the attractiveness of alternatives for customers holding products that offer contractual surrender benefits that are not market value adjusted, which could also contribute to adverse policyholder behaviour experience. As well, adverse claims experience could result from systematic anti-selection, which could arise from the development of investor owned and secondary markets for life insurance policies, anti-selective lapse behaviour, underwriting process failures, anti-selective policyholder behaviour due to greater consumer accessibility to home-based medical screening, or other factors.

External market conditions determine the availability, terms and cost of reinsurance protection which could impact our financial position and our ability to write new policies.

- As part of our overall risk and capital management strategy, we purchase reinsurance protection on certain risks underwritten or assumed by our various insurance businesses. As the global reinsurance industry continues to review and optimize their business models, certain of our reinsurers have attempted to increase rates on our existing reinsurance contracts. The ability of our reinsurers to increase rates depends upon the terms of each reinsurance contract. Typically, the reinsurer's ability to raise rates is restricted by a number of terms in our reinsurance contracts, which we seek to enforce. We believe our reinsurance provisions are appropriate at December 31, 2019; however, there can be no assurance regarding the impact of future rate increase actions taken by our reinsurers. Accordingly, future rate increase actions by our reinsurers could result in accounting charges, an increase in the cost of reinsurance, and the assumption of more risk on business already reinsured.
- In addition, an increase in the cost of reinsurance could also adversely affect our ability to write future business or result in the assumption of more risk with respect to policies we issue. Premium rates charged on new policies we write are based, in part, on the assumption that reinsurance will be available at a certain cost. Certain reinsurers may attempt to increase the rates they charge us for new policies we write, and for competitive reasons, we may not be able to raise the premium rates we charge for newly written policies to offset the increase in reinsurance rates. If the cost of reinsurance were to increase, if reinsurance were to become unavailable, and if alternatives to reinsurance were not available, our ability to write new policies at competitive premium rates could be adversely affected.

f. Operational Risk Factors

Operational risk is naturally present in all of our business activities and encompasses a broad range of risks, including regulatory compliance failures, legal disputes, technology failures, business interruption, information security and privacy breaches, human resource management failures, processing errors, modelling errors, business integration, theft and fraud, and damage to physical assets. Exposures can take the form of financial losses, regulatory sanctions, loss of competitive positioning, or damage to our reputation. Operational risk is also embedded in all the practices we use to manage other risks; therefore, if not managed effectively, operational risk can impact our ability to manage other key risks such as credit risk, market risk, liquidity risk and insurance risk.

Adverse publicity, litigation or regulatory action resulting from our business practices or actions by our employees, representatives and/or business partners, could erode our corporate image and damage our franchise value and/or create losses.

- Manulife's reputation is one of its most valuable assets. Harm to a company's reputation is often a consequence of risk control failure, whether associated with complex financial transactions or relatively routine operational activities. Manulife's reputation could also be harmed by the actions of third parties with whom we do business. Our representatives include affiliated broker-dealers, agents, wholesalers and independent distributors, such as broker-dealers and banks, whose services and representations our customers rely on. Business partners include, among others, third parties to whom we outsource certain functions and that we rely on to fulfill various obligations.
- If any of these representatives or business partners fail to adequately perform their responsibilities, or monitor its own risk, these failures could affect our business reputation and operations. While we seek to maintain adequate internal risk management policies and procedures and protect against performance failures, events may occur that could cause us to lose customers or suffer legal or regulatory sanctions, which could have a material adverse effect on our reputation, our business, and our results of operations. For further discussion of government regulation and legal proceedings refer to "Government Regulation" in MFC's Annual Information Form dated February 12, 2020 and note 18 of the Consolidated Financial Statements.

If we are not able to attract, motivate and retain agency leaders and individual agents, our competitive position, growth and profitability will suffer.

- We must attract and retain sales representatives to sell our products. Strong competition exists among financial services companies for efficient and effective sales representatives. We compete with other financial services companies for sales representatives primarily on the basis of our financial position, brand, support services and compensation and product features. Any of these factors could change either because we change the Company or our products, or because our competitors change theirs and we are unable or unwilling to adapt. If we are unable to attract and retain sufficient sales representatives to sell our products, our ability to compete and revenues from new sales would suffer, which could have a material adverse effect on our business, results of operations and financial condition.

If we are unable to complete key projects on time, on budget, and capture planned benefits, our business strategies and plans, and operations may be impaired.

- We must successfully deliver a number of key projects in order to implement our business strategies and plans. If we are unable to complete these projects in accordance with planned schedules, and to capture projected benefits, there could be a material adverse effect on our business and financial condition.

Key business processes may fail, causing material loss events and impacting our customers and reputation

- A large number of complex transactions are performed by the organization, and there is risk that errors may have significant impact on our customers or result in a loss to the organization. Controls are in place that seek to ensure processing accuracy for our most significant business processes, and escalation and reporting processes have been established for when errors do occur.

The interconnectedness of our operations and risk management strategies could expose us to risk if all factors are not appropriately considered and communicated.

- Our business operations, including strategies and operations related to risk management, asset liability management and liquidity management, are interconnected and complex. Changes in one area may have a secondary impact in another area of our operations. For example, risk management actions, such as the increased use of interest rate swaps, could have implications for the Company's Global Wealth and Asset Management segment or its Treasury function, as this strategy could result in the need to post additional amounts of collateral. Failure to appropriately consider these inter-relationships, or effectively communicate changes in strategies or activities across our operations, could have a negative impact on the strategic objectives or operations of another group. Further, failure to consider these inter-relationships in our modeling and financial and strategic decision-making processes could have a negative impact on our operations.

Our risk management policies, procedures and strategies may leave us exposed to unidentified or unanticipated risks, which could negatively affect our business, results of operations and financial condition.

- We have devoted significant resources to develop our risk management policies, procedures and strategies and expect to continue to do so in the future. Nonetheless, there is a risk that our policies, procedures and strategies may not be comprehensive. Many of our methods for measuring and managing risk and exposures are based upon the use of observed historical market behaviour or statistics based on historical models. Future behaviour may be very different from past behaviour, especially if there are some fundamental changes that affect future behaviour. As an example, the increased occurrence of negative interest rates can make it difficult to model future interest rates as interest rate models have been generally developed for an environment of positive interest rates. As a result, these methods may not fully predict future exposures, which can be significantly greater than our historical measures indicate. Other risk management methods depend upon the evaluation and/or reporting of information regarding markets, clients, client transactions, catastrophe occurrence or other matters publicly available or otherwise accessible to us. This information may not always be accurate, complete, up-to-date or properly evaluated or reported.

We are subject to tax audits, tax litigation or similar proceedings, and as a result we may owe additional taxes, interest and penalties in amounts that may be material.

- We are subject to income and other taxes in the jurisdictions in which we do business. In determining our provisions for income taxes and our accounting for tax related matters in general, we are required to exercise judgment. We regularly make estimates where the ultimate tax determination is uncertain. There can be no assurance that the final determination of any tax audit, appeal of the decision of a taxing authority, tax litigation or similar proceedings will not be materially different from that reflected in our historical financial statements. The assessment of additional taxes, interest and penalties could be materially adverse to our current and future results of operations and financial condition.

Our non-North American operations face political, legal, operational and other risks that could negatively affect those operations or our results of operations and financial condition.

- A substantial portion of our revenue and net income attributed to shareholders is derived from our operations outside of North America, primarily in key Asian markets. Some of these key geographical markets are developing and are rapidly growing countries and markets that present unique risks that we do not face, or are negligible, in our operations in Canada or the U.S. Our operations outside of North America face the risk of discriminatory regulation, political and economic instability, market volatility and significant inflation, limited protection for, or increased costs to protect intellectual property rights, inability to protect and/or enforce contractual or legal rights, nationalization or expropriation of assets, price controls and exchange controls or other restrictions that prevent us from transferring funds from these operations out of the countries in which they operate or converting local currencies we hold into Canadian or U.S. dollars. Failure to manage these risks could have a significant negative impact on our operations and profitability.
- Any plans to expand our global operations in markets where we operate and potentially in new markets may require considerable management time, as well as start-up expenses for market development before any significant revenues and earnings are generated. Operations in new foreign markets may achieve low margins or may be unprofitable, and expansion in existing markets may be affected by local economic and market conditions.

We are regularly involved in litigation.

- We are regularly involved in litigation, either as a plaintiff or defendant. These cases could result in an unfavourable resolution and could have a material adverse effect on our results of operations and financial condition. For further discussion of legal proceedings refer to note 18 of the 2019 Annual Consolidated Financial Statements.

We are exposed to investors trying to profit from short positions in our stock.

- Short sellers seek to profit from a decline in the price of our common shares. Through their actions and public statements, they may encourage the decline in price from which they profit and may encourage others to take short positions in our shares. The existence of such short positions and the related publicity may lead to continued volatility in our common share price.

System failures or events that impact our facilities may disrupt business operations.

- Technology is used in virtually all aspects of our business and operations; in addition, part of our strategy involves the expansion of technology to directly serve our customers. An interruption in the service of our technology resulting from system failure, cyber-attack, human error, natural disaster, human-made disaster, pandemic, or other unpredictable events beyond reasonable control could prevent us from effectively operating our business.
- While our facilities and operations are distributed across the globe, we can experience extreme weather, natural disasters, civil unrest, human-made disasters, power outages, pandemic, and other events which can prevent access to, and operations within, the facilities for our employees, partners, and other parties that support our business operations.
- We take measures to plan, structure and protect against routine events that may impact our operations, and maintain plans to recover from unpredictable events. An interruption to our operations may subject us to regulatory sanctions and legal claims, lead to a loss of customers, assets and revenues, result in unauthorized disclosures of personal or confidential information, or otherwise adversely affect us from a financial, operational and reputational perspective.

An information security or privacy breach of our operations or of a related third party could adversely impact our business, results of operations, financial condition, and reputation.

- It is possible that the Company may not be able to anticipate or to implement effective preventive measures against all disruptions or privacy and security breaches, especially because the techniques used change frequently, generally increase in sophistication, often are not recognized until launched, and because cyber-attacks can originate from a wide variety of sources, including organized crime, hackers, terrorists, activists, and other external parties, including parties sponsored by hostile foreign governments. Those parties may also attempt to fraudulently induce employees, customers, and other users of the Company's systems or third-party service providers to disclose sensitive information in order to gain access to the Company's data or that of its customers or clients. We, our customers, regulators and other third parties have been subject to, and are likely to continue to be the target of, cyber-attacks, including computer viruses, malicious or destructive code, phishing attacks, denial of service and other security incidents, that could result in the unauthorized release, gathering, monitoring, misuse, loss or destruction of personal, confidential, proprietary and other information of the Company, our employees, our customers or of third parties, or otherwise materially disrupt our or our customers' or other third parties' network access or business operations. These attacks could adversely impact us from a financial, operational and reputational perspective.
- The Company has an Information Risk Management Program, which includes information and cyber security defenses, to protect our networks and systems from attacks; however, there can be no assurance that these counter measures will be successful in every instance in protecting our networks against advanced attacks. In addition to protection, detection and response mechanisms, the Company maintains cyber risk insurance, but this insurance may not cover all costs associated with the financial, operational and reputational consequences of personal, confidential or proprietary information being compromised.

Competition for the best people is intense and an inability to recruit qualified individuals may negatively impact our ability to execute on business strategies or to conduct our operations.

- We compete with other insurance companies and financial institutions for qualified executives, employees and agents. We must attract and retain top talent to maintain our competitive advantage. Failure to attract and retain the best people could adversely impact our business.

Model risk may arise from the inappropriate use or interpretation of models or their output, or the use of deficient models, data or assumptions.

- We are relying on some highly complex models for pricing, valuation and risk measurement, and for input to decision making. Consequently, the risk of inappropriate use or interpretation of our models or their output, or the use of deficient models, could have a material adverse effect on our business.
- We are continuing to enhance our valuation models and processes across the organization. We do not expect this initiative to result in significant reserve adjustments. However, as we systematically review our models, there could be updates to our assumptions and methodologies that result in reserve changes.

Fraud risks may arise from incidents related to identity theft and account takeovers.

Policies and procedures are in place to prevent and detect fraud incidents; however, our existing control environment may not be able to mitigate all possible incidents, which could adversely impact our business, results of operations, financial condition, and reputation. Policies and procedures are being reviewed to enhance our capabilities to better protect against more sophisticated fraud threats, but we may nevertheless not be able to mitigate all possible incidents.

Contracted third parties may fail to deliver against contracted activities.

We rely on third parties to perform a variety of activities on our behalf, and failure of our most significant third parties to meet their contracted obligations may impact our ability to meet our strategic objectives or may directly impact our customers. Vendor

governance processes are in place that seek to ensure that appropriate due diligence is conducted at time of vendor contracting, and ongoing vendor monitoring activities are in place that seek to ensure that the contracted services are being fulfilled to satisfaction, but we may nevertheless not be able to mitigate all possible failures.

Environmental risk may arise related to our commercial mortgage loan portfolio and owned property or from our business operations.

Environmental risk may originate from investment properties that are subject to natural or human-made environmental risk. Real estate assets may be owned, leased and/or managed, as well as mortgaged by Manulife and we might enter into the chain of liability due to foreclosure ownership when in default.

Liability under environmental protection laws resulting from our commercial mortgage loan portfolio and owned property (including commercial real estate, oil and gas, timberland and farmland properties) may adversely impact our reputation, results of operations and financial condition. Under applicable laws, contamination of a property with hazardous materials or substances may give rise to a lien on the property to secure recovery of the costs of cleanup. In some instances, this lien has priority over the lien of an existing mortgage encumbering the property. The environmental risk may result from on-site or off-site (adjacent) due to migration of regulated pollutants or contaminants with financial or reputational environmental risk and liability consequences by virtue of strict liability. Environmental risk could also arise from natural disasters (e.g., climate change, weather, fire, earthquake, floods, pests) or human activities (use of chemicals, pesticides) conducted within the site or when impacted from adjacent sites.

Additionally, as lender, we may incur environmental liability (including without limitation liability for clean-up, remediation and damages incurred by third parties) similar to that of an owner or operator of the property, if we or our agents exercise sufficient control over the operations at the property. We may also have liability as the owner and/or operator of real estate for environmental conditions or contamination that exist or occur on the property or affecting other property.

In addition, failure to adequately prepare for the potential impacts of climate change may have a negative impact on our financial position or our ability to operate. Potential impacts may be direct or indirect and may include: business losses or disruption resulting from extreme weather conditions; the impact of changes in legal or regulatory framework made to address climate change; impact to fixed income asset values for portfolio investments in fossil-fuel related industries; or increased mortality or morbidity resulting from environmental damage or climate change.

g. Additional Risk Factors That May Affect Future Results

Other factors that may affect future results include changes in government trade policy, monetary policy or fiscal policy; political conditions and developments in or affecting the countries in which we operate; technological changes; public infrastructure disruptions; changes in consumer spending and saving habits; the possible impact on local, national or global economies from public health emergencies, such as an influenza pandemic, and international conflicts and other developments including those relating to terrorist activities. Although we take steps to anticipate and minimize risks in general, unforeseen future events may have a negative impact on our business, financial condition and results of operations.

We caution that the preceding discussion of risks that may affect future results is not exhaustive. When relying on our forward-looking statements to make decisions with respect to our Company, investors and others should carefully consider the foregoing risks, as well as other uncertainties and potential events, and other external and Company specific risks that may adversely affect the future business, financial condition or results of operations of our Company.

12. Controls and Procedures

a. Disclosure Controls and Procedures

Our disclosure controls and procedures are designed to provide reasonable assurance that information required to be disclosed by us is recorded, processed, summarized, and reported accurately and completely and within the time periods specified under Canadian and U.S. securities laws. Our process includes controls and procedures that are designed to ensure that information is accumulated and communicated to management, including the CEO and CFO, to allow timely decisions regarding required disclosure.

As of December 31, 2019, management evaluated the effectiveness of its disclosure controls and procedures as defined under the rules adopted by the U.S. Securities and Exchange Commission and the Canadian securities regulatory authorities. This evaluation was performed under the supervision of the Audit Committee, the CEO and CFO. Based on that evaluation, the CEO and CFO concluded that our disclosure controls and procedures were effective as at December 31, 2019.

MFC's Audit Committee has reviewed this MD&A and the 2019 Consolidated Financial Statements and MFC's Board of Directors approved these reports prior to their release.

b. Management's Report on Internal Control over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting. The Company's internal control system was designed to provide reasonable assurance to management and the Board of Directors regarding the preparation and fair presentation of published financial statements in accordance with generally accepted accounting principles. All internal control systems, no matter how well designed, have inherent limitations due to manual controls. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation.

Management maintains a comprehensive system of controls intended to ensure that transactions are executed in accordance with management's authorization, assets are safeguarded, and financial records are reliable. Management also takes steps to ensure that information and communication flows are effective and to monitor performance, including performance of internal control procedures.

Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2019 based on the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission 2013 framework in Internal Control – Integrated Framework. Based on this assessment, management believes that, as of December 31, 2019, the Company's internal control over financial reporting is effective.

The effectiveness of the Company's internal control over financial reporting as of December 31, 2019 has been audited by Ernst & Young LLP, the Company's independent registered public accounting firm that also audited the Consolidated Financial Statements of the Company for the year ended December 31, 2019. Their report expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting as of December 31, 2019.

c. Changes in Internal Control over Financial Reporting

No changes were made in our internal control over financial reporting during the year ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

13. Performance and Non-GAAP Measures

We use a number of non-GAAP financial measures to measure overall performance and to assess each of our businesses. A financial measure is considered a non-GAAP measure for Canadian securities law purposes if it is presented other than in accordance with generally accepted accounting principles used for the Company's audited financial statements. Non-GAAP measures include: core earnings (loss); core ROE; diluted core earnings per common share; core earnings before income taxes, depreciation and amortization ("core EBITDA"); core EBITDA margin; core investment gains, constant exchange rate basis (measures that are reported on a constant exchange rate basis include percentage growth/decline in core earnings, sales, APE sales, gross flows, core EBITDA, new business value ("NBV"), new business value margin ("NBV margin"), assets under management, and assets under management and administration ("AUMA")); assets under administration; expense efficiency ratio; assets under management and administration; assets under management; consolidated capital; embedded value; new business value; new business value margin; sales; APE sales; gross flows; and net flows. Non-GAAP financial measures are not defined terms under GAAP and, therefore, are unlikely to be comparable to similar terms used by other issuers. Therefore, they should not be considered in isolation or as a substitute for any other financial information prepared in accordance with GAAP.

Effective January 1, 2018, the Company's reporting segments have been reorganized as outlined under the "Manulife Financial Corporation" section at the beginning of the MD&A. In addition, we made the following adjustments to our reporting:

- The definition of the Global Wealth and Asset Management business now includes the Guaranteed Interest Account portion of the Canadian Pension defined contribution business;
- The NBV calculation has been refined for our Canadian segregated fund guarantee business; and
- The calculation of net flows and AUMA now includes the sale of non-proprietary products in Canada.

Core earnings (loss) is a non-GAAP measure which we believe aids investors in better understanding the long-term earnings capacity and valuation of the business. Core earnings allows investors to focus on the Company's operating performance by excluding the direct impact of changes in equity markets and interest rates, changes in actuarial methods and assumptions as well as a number of other items, outlined below, that we believe are material, but do not reflect the underlying earnings capacity of the business. For example, due to the long-term nature of our business, the mark-to-market movements of equity markets, interest rates, foreign currency exchange rates and commodity prices from period-to-period can, and frequently do, have a substantial impact on the reported amounts of our assets, liabilities and net income attributed to shareholders. These reported amounts are not actually realized at the time and may never be realized if the markets move in the opposite direction in a subsequent period. This makes it very difficult for investors to evaluate how our businesses are performing from period-to-period and to compare our performance with other issuers.

We believe that core earnings better reflect the underlying earnings capacity and valuation of our business. We use core earnings as the basis for management planning and reporting and, along with net income attributed to shareholders, as a key metric used in our short and mid-term incentive plans at the total Company and operating segment level.

While core earnings is relevant to how we manage our business and offers a consistent methodology, it is not insulated from macro-economic factors which can have a significant impact. See "Quarterly Financial Information" below for reconciliation of core earnings to net income attributed to shareholders.

Any future changes to the core earnings definition referred to below, will be disclosed.

Items included in core earnings:

1. Expected earnings on in-force policies, including expected release of provisions for adverse deviation, fee income, margins on group business and spread business such as Manulife Bank and asset fund management.
2. Macro hedging costs based on expected market returns.
3. New business strain and gains.
4. Policyholder experience gains or losses.
5. Acquisition and operating expenses compared with expense assumptions used in the measurement of policy liabilities.
6. Up to \$400 million of net favourable investment-related experience reported in a single year, which are referred to as "core investment gains". This means up to \$100 million in the first quarter, up to \$200 million on a year-to-date basis in the second quarter, up to \$300 million on a year-to-date basis in the third quarter and up to \$400 million on a full year basis in the fourth quarter. Any investment-related experience losses reported in a quarter will be offset against the net year-to-date investment-related experience gains with the difference being included in core earnings subject to a maximum of the year-to-date core investment gains and a minimum of zero, which reflects our expectation that investment-related experience will be positive through-the-business cycle. To the extent any investment-related experience losses cannot be fully offset in a quarter they will be carried forward to be offset against investment-related experience gains in subsequent quarters in the same year, for purposes of determining core investment gains. Investment-related experience relates to fixed income investing, ALDA returns, credit experience and asset mix changes other than those related to a strategic change. An example of a strategic asset mix change is outlined below.
 - This favourable and unfavourable investment-related experience is a combination of reported investment experience as well as the impact of investing activities on the measurement of our policy liabilities. We do not attribute specific components of investment-related experience to amounts included or excluded from core earnings.

- The \$400 million threshold represents the estimated average annualized amount of net favourable investment-related experience that the Company reasonably expects to achieve through-the-business cycle based on historical experience. It is not a forecast of expected net favourable investment-related experience for any given fiscal year.
 - Our average net annualized investment-related experience calculated from the introduction of core earnings in 2012 to the end of 2019 was \$527 million (2012 to the end of 2018 was \$493 million).
 - The decision announced on December 22, 2017 to reduce the allocation to ALDA in the portfolio asset mix supporting our legacy businesses was the first strategic asset mix change since we introduced the core earnings metric in 2012. We refined our description of investment-related experience in 2017 to note that asset mix changes other than those related to a strategic change are taken into consideration in the investment-related experience component of core investment gains.
 - While historical investment return time horizons may vary in length based on underlying asset classes generally exceeding 20 years, for purposes of establishing the threshold, we look at a business cycle that is five or more years and includes a recession. We monitor the appropriateness of the threshold as part of our annual five-year planning process and would adjust it, either to a higher or lower amount, in the future if we believed that our threshold was no longer appropriate.
 - Specific criteria used for evaluating a potential adjustment to the threshold may include, but are not limited to, the extent to which actual investment-related experience differs materially from actuarial assumptions used in measuring insurance contract liabilities, material market events, material dispositions or acquisitions of assets, and regulatory or accounting changes.
7. Earnings on surplus other than mark-to-market items. Gains on available-for-sale (“AFS”) equities and seed money investments in new segregated and mutual funds are included in core earnings.
 8. Routine or non-material legal settlements.
 9. All other items not specifically excluded.
 10. Tax on the above items.
 11. All tax related items except the impact of enacted or substantively enacted income tax rate changes.

Items excluded from core earnings:

1. The direct impact of equity markets and interest rates and variable annuity guarantee liabilities includes the items listed below.
 - The earnings impact of the difference between the net increase (decrease) in variable annuity liabilities that are dynamically hedged and the performance of the related hedge assets. Our variable annuity dynamic hedging strategy is not designed to completely offset the sensitivity of insurance and investment contract liabilities to all risks or measurements associated with the guarantees embedded in these products for a number of reasons, including; provisions for adverse deviation, fund performance, the portion of the interest rate risk that is not dynamically hedged, realized equity and interest rate volatilities and changes to policyholder behaviour.
 - Gains (charges) on variable annuity guarantee liabilities not dynamically hedged.
 - Gains (charges) on general fund equity investments supporting policy liabilities and on fee income.
 - Gains (charges) on macro equity hedges relative to expected costs. The expected cost of macro hedges is calculated using the equity assumptions used in the valuation of insurance and investment contract liabilities.
 - Gains (charges) on higher (lower) fixed income reinvestment rates assumed in the valuation of insurance and investment contract liabilities.
 - Gains (charges) on sale of AFS bonds and open derivatives not in hedging relationships in the Corporate and Other segment.
2. Net favourable investment-related experience in excess of \$400 million per annum or net unfavourable investment-related experience on a year-to-date basis.
3. Mark-to-market gains or losses on assets held in the Corporate and Other segment other than gains on AFS equities and seed money investments in new segregated or mutual funds.
4. Changes in actuarial methods and assumptions. As noted in the “Critical Actuarial and Accounting Policies” section above, policy liabilities for IFRS are valued in Canada under standards established by the Actuarial Standards Board. The standards require a comprehensive review of actuarial methods and assumptions to be performed annually. The review is designed to reduce the Company’s exposure to uncertainty by ensuring assumptions for both asset related and liability related risks remain appropriate and is accomplished by monitoring experience and selecting assumptions which represent a current best estimate view of expected future experience, and margins for adverse deviations that are appropriate for the risks assumed. Changes related to URR are included in the direct impact of equity markets and interest rates and variable annuity guarantee liabilities. By excluding the results of the annual reviews, core earnings assist investors in evaluating our operational performance and comparing our operational performance from period to period with other global insurance companies because the associated gain or loss is not reflective of current year performance and not reported in net income in most actuarial standards outside of Canada.
5. The impact on the measurement of policy liabilities of changes in product features or new reinsurance transactions, if material.
6. Goodwill impairment charges.
7. Gains or losses on disposition of a business.
8. Material one-time only adjustments, including highly unusual/extraordinary and material legal settlements or other items that are material and exceptional in nature.
9. Tax on the above items.
10. Impact of enacted or substantially enacted income tax rate changes.

Core return on common shareholders' equity ("core ROE") is a non-GAAP profitability measure that presents core earnings available to common shareholders as a percentage of the capital deployed to earn the core earnings. The Company calculates core ROE using average common shareholders' equity.

Diluted core earnings per common share is core earnings available to common shareholders expressed per diluted weighted average common share outstanding.

The Company also uses financial performance measures that are prepared on a **constant exchange rate basis**, which are non-GAAP measures that exclude the impact of currency fluctuations (from local currency to Canadian dollars at a total Company level and from local currency to U.S. dollars in Asia). Amounts stated on a constant exchange rate basis in this report are calculated, as appropriate, using the income statement and balance sheet exchange rates effective for the fourth quarter of 2019. Measures that are reported on a constant exchange rate basis include growth in core earnings, sales, APE sales, gross flows, core EBITDA, new business value, new business value margin, assets under management, and assets under management and administration.

Assets under management and administration ("AUMA") is a non-GAAP measure of the size of the Company. It is comprised of the non-GAAP measures assets under management ("AUM"), which includes both assets of general account and external client assets for which we provide investment management services, and assets under administration, which includes assets for which we provide administrative services only. Assets under management and administration is a common industry metric for WAM businesses.

Assets under management and administration

As at December 31, (\$ millions)	2019	2018
Total invested assets	\$ 378,527	\$ 353,664
Segregated funds net assets	343,108	313,209
Assets under management per financial statements	721,635	666,873
Mutual funds	217,015	188,729
Institutional advisory accounts (excluding segregated funds)	95,410	95,813
Other funds	9,401	7,658
Total assets under management	1,043,461	959,073
Other assets under administration	145,397	124,449
Currency impact	–	(36,054)
AUMA at constant exchange rates	\$ 1,188,858	\$ 1,047,468

Consolidated capital

The definition we use for consolidated capital, a non-GAAP measure, serves as a foundation of our capital management activities at the MFC level. For regulatory reporting purposes, the numbers are further adjusted for various additions or deductions to capital as mandated by the guidelines used by OSFI. Consolidated capital is calculated as the sum of: (i) total equity excluding accumulated other comprehensive income ("AOCI") on cash flow hedges; and (ii) liabilities for capital instruments.

Consolidated capital

As at December 31, (\$ millions)	2019	2018
Total equity	\$ 50,106	\$ 47,151
Add AOCI loss on cash flow hedges	143	127
Add qualifying capital instruments	7,120	8,732
Consolidated capital	\$ 57,369	\$ 56,010

Core EBITDA is a non-GAAP measure which Manulife uses to better understand the long-term earnings capacity and valuation of our Global WAM business on a basis more comparable to how the profitability of global asset managers is generally measured. Core EBITDA presents core earnings before the impact of interest, taxes, depreciation, and amortization. Core EBITDA excludes certain acquisition expenses related to insurance contracts in our retirement businesses which are deferred and amortized over the expected life time of the customer relationship under the CALM. Core EBITDA was selected as a key performance indicator for our Global WAM business, as EBITDA is widely used among asset management peers, and core earnings is a primary profitability metric for the Company overall.

Core EBITDA margin is a non-GAAP measure which Manulife uses to better understand the long-term profitability of our Global WAM business on a more comparable basis to how profitability of global asset managers are measured. Core EBITDA margin presents core earnings before the impact of interest, taxes, depreciation, and amortization divided by total revenue from these businesses. Core EBITDA margin was selected as a key performance indicator for our Global WAM business, as EBITDA margin is widely used among asset management peers, and core earnings is a primary profitability metric for the Company overall.

Global Wealth and Asset Management

For the years ended December 31,
(\$ millions)

	2019	2018
Core EBITDA	\$ 1,536	\$ 1,497
Amortization of deferred acquisition costs and other depreciation	(311)	(301)
Amortization of deferred sales commissions	(81)	(98)
Core earnings before income taxes	1,144	1,098
Core income tax (expense) recovery	(123)	(113)
Core earnings	\$ 1,021	\$ 985

Expense efficiency ratio is a non-GAAP measure which Manulife uses to measure progress towards our target to be more efficient. Efficiency ratio is defined as pre-tax general expenses included in core earnings divided by the sum of pre-tax core earnings and pre-tax general expenses included in core earnings.

Embedded value ("EV") is a measure of the present value of shareholders' interests in the expected future distributable earnings on in-force business reflected in the Consolidated Statements of Financial Position of Manulife, excluding any value associated with future new business. EV is calculated as the sum of the adjusted net worth and the value of in-force business. The adjusted net worth is the IFRS shareholders' equity adjusted for goodwill and intangibles, fair value of surplus assets, the carrying value of debt and preferred shares, and local statutory balance sheet, regulatory reserve, and capital for Manulife's Asian business. The value of in-force business in Canada and the U.S. is the present value of expected future IFRS earnings on in-force business less the present value of the cost of holding capital to support the in-force business under the MCCR framework. The MCCR framework was replaced by the LICAT framework on January 1, 2018 and LICAT was used to calculate EV as at December 31, 2018. It has been used to calculate quarterly NBV starting January 1, 2018. The value of in-force business in Asia reflects local statutory earnings and capital requirements. The value of in-force excludes our Global WAM, Manulife Bank and Property and Casualty Reinsurance businesses.

New business value ("NBV") is the change in embedded value as a result of sales in the reporting period. NBV is calculated as the present value of shareholders' interests in expected future distributable earnings, after the cost of capital, on actual new business sold in the period using assumptions that are consistent with the assumptions used in the calculation of embedded value. NBV excludes businesses with immaterial insurance risks, such as the Company's Global WAM, Manulife Bank and the short-term Property and Casualty Reinsurance businesses. NBV is a useful metric to evaluate the value created by the Company's new business franchise.

New business value margin ("NBV margin") is calculated as NBV divided by APE excluding non-controlling interests. APE is calculated as 100% of annualized first year premiums for recurring premium products, and as 10% of single premiums for single premium products. Both NBV and APE used in the NBV margin calculation are after non-controlling interests and exclude our Global WAM, Manulife Bank and Property and Casualty Reinsurance businesses. The NBV margin is a useful metric to help understand the profitability of our new business.

Sales are measured according to product type:

For individual insurance, sales include 100% of new annualized premiums and 10% of both excess and single premiums. For individual insurance, new annualized premiums reflect the annualized premium expected in the first year of a policy that requires premium payments for more than one year. Single premium is the lump sum premium from the sale of a single premium product, e.g. travel insurance. Sales are reported gross before the impact of reinsurance.

For group insurance, sales include new annualized premiums and administrative services only premium equivalents on new cases, as well as the addition of new coverages and amendments to contracts, excluding rate increases.

APE sales is comprised of 100% of regular premiums/deposits and 10% of single premiums/deposits for both insurance and insurance-based wealth accumulation products.

Insurance-based wealth accumulation product sales include all new deposits into variable and fixed annuity contracts. As we discontinued sales of new Variable Annuity contracts in the U.S. in 1Q13, subsequent deposits into existing U.S. Variable Annuity contracts are not reported as sales. Asia variable annuity deposits are included in APE sales.

Bank new lending volumes include bank loans and mortgages authorized in the period.

Gross flows is a new business measure presented for our Global WAM business and includes all deposits into mutual funds, college savings 529 plans, group pension/retirement savings products, private wealth and institutional asset management products. Gross flows is a common industry metric for WAM businesses as it provides a measure of how successful the businesses are at attracting assets.

Net flows is presented for our Global WAM business and includes gross flows less redemptions for mutual funds, college savings 529 plans, group pension/retirement savings products, private wealth and institutional asset management products. Net flows is a common industry metric for WAM businesses as it provides a measure of how successful the businesses are at attracting and retaining assets. When gross flows exceed redemptions, net flows will be positive and will be referred to as net inflows. Conversely, when redemptions exceed gross flows, net flows will be negative and will be referred to as net outflows.

14. Additional Disclosures

a. Contractual Obligations

In the normal course of business, the Company enters into contracts that give rise to obligations fixed by agreement as to the timing and dollar amount of payment.

As at December 31, 2019, the Company's contractual obligations and commitments are as follows:

Payments due by period (\$ millions)	Total	Less than 1 year	1 to 3 years	3 to 5 years	After 5 years
Long-term debt ⁽¹⁾	\$ 6,196	\$ 663	\$ 277	\$ 277	\$ 4,979
Liabilities for capital instruments ⁽¹⁾	8,778	234	470	912	7,162
Investment commitments	8,681	2,914	3,025	1,960	782
Lease Liabilities	374	107	142	49	76
Insurance contract liabilities ⁽²⁾	797,040	9,682	12,084	16,587	758,687
Investment contract liabilities ⁽¹⁾	5,095	289	484	476	3,846
Deposits from Bank clients	21,488	16,872	2,632	1,984	—
Other	611	204	254	147	6
Total contractual obligations	\$ 848,263	\$ 30,965	\$ 19,368	\$ 22,392	\$ 775,538

⁽¹⁾ The contractual payments include principal, interest and distributions. The contractual payments reflect the amounts payable from January 1, 2020 up to and including the final contractual maturity date. In the case of floating rate obligations, the floating rate index is based on the interest rates as at December 31, 2019 and is assumed to remain constant to the final contractual maturity date. The Company may have the contractual right to redeem or repay obligations prior to maturity and if such right is exercised, total contractual obligations paid and the timing of payment could vary significantly from the amounts and timing included in the table.

⁽²⁾ Insurance contract liabilities cash flows include estimates related to the timing and payment of death and disability claims, policy surrenders, policy maturities, annuity payments, minimum guarantees on segregated fund products, policyholder dividends, commissions and premium taxes offset by contractual future premiums on in-force contracts. These estimated cash flows are based on the best estimate assumptions used in the determination of insurance contract liabilities. These amounts are undiscounted and reflect recoveries from reinsurance agreements. Due to the use of assumptions, actual cash flows may differ from these estimates (see "Policy Liabilities"). Cash flows include embedded derivatives measured separately at fair value.

b. Legal and Regulatory Proceedings

We are regularly involved in legal actions, both as a defendant and as a plaintiff. Information on legal and regulatory proceedings can be found in note 18 of the 2019 Annual Consolidated Financial Statements.

c. Fourth Quarter Financial Highlights

Profitability

As at and for the quarters ended December 31,
(\$ millions, unless otherwise stated)

	2019	2018	2017
Profitability:			
Net income attributed to shareholders	\$ 1,228	\$ 593	\$ (1,606)
Core earnings ^{(1),(2)}	\$ 1,477	\$ 1,337	\$ 1,205
Diluted earnings per common share (\$)	\$ 0.61	\$ 0.28	\$ (0.83)
Diluted core earnings per common share (\$) ⁽¹⁾	\$ 0.73	\$ 0.65	\$ 0.59
Return on common shareholders' equity ("ROE")	10.3%	5.3%	(17.1)%
Core ROE ⁽¹⁾	12.5%	12.5%	12.1%

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" above.

⁽²⁾ Impact of currency movement on the fourth quarter of 2019 ("4Q19") core earnings compared with 4Q18 was a \$4 million favourable variance.

Manulife's 4Q19 net income attributed to shareholders was \$1,228 million compared with \$593 million in 4Q18. Net income attributed to shareholders is comprised of core earnings (consisting of items we believe reflect the underlying earnings capacity of the business), which amounted to \$1,477 million in 4Q19 compared with \$1,337 million in 4Q18, and items excluded from core earnings, which netted to charges of \$249 million in 4Q19 compared with charges of \$744 million in 4Q18 for a period-over-period decrease in charges of \$495 million. Net income attributed to shareholders in 4Q19 was higher than in 4Q18 due to \$0.3 billion higher investment-related experience and a lower charge of \$0.3 billion related to the direct impact of markets.

The \$140 million increase in core earnings compared with 4Q18 was primarily driven by in-force and new business growth in the U.S., Hong Kong and Asia Other, growth in Global Wealth and Asset Management and the non-recurrence of market losses on seed money investments in our surplus portfolio, partially offset by unfavourable policyholder experience in Canada and the U.S., lower new business volumes in Japan and the impact on earnings of actions taken over the last 12 months to improve the capital efficiency of our legacy businesses. Core earnings in 4Q19 included net policyholder experience losses of \$22 million post-tax (\$38 million pre-tax) compared with gains of \$11 million post-tax (\$13 million pre-tax) in 4Q18.¹ Reinsurance and ALDA portfolio mix actions to improve the capital efficiency of our legacy businesses resulted in \$17 million lower core earnings in 4Q19 compared with 4Q18.

¹ Policyholder experience includes gains of \$20 million from customers who have opted to change their existing medical coverage to the VHIS products in Hong Kong. These gains did not have a material impact on core earnings as they were offset by new business strain.

Core earnings by segment is presented in the table below for the periods presented.

For the quarters ended December 31,

(\$ millions)	2019	2018
Core earnings^{(1),(2)}		
Asia	\$ 494	\$ 463
Canada	288	305
U.S.	489	454
Global Wealth and Asset Management	265	231
Corporate and Other (excluding core investment gains)	(159)	(216)
Core investment gains ⁽¹⁾	100	100
Core earnings	\$ 1,477	\$ 1,337

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" above.

⁽²⁾ 2018 comparatives for core earnings in each segment have been updated to reflect the 2019 methodology for allocating capital and interest on surplus to our insurance segments from the Corporate and Other segment.

In Asia, core earnings were \$494 million in 4Q19 compared with \$463 million in 4Q18, an increase of 5%, after adjusting for the impact of changes in foreign currency exchange rates. The increase in core earnings was driven by higher new business volumes and in-force business growth in Hong Kong and Asia Other, partially offset by lower new business volumes in Japan. Sales of the recently-launched VHIS products in Hong Kong did not have a material current period impact on core earnings as experience gains from customers who have opted to change their existing medical coverage to the new VHIS product were offset by new business strain.

In Canada, core earnings were \$288 million in 4Q19 compared with \$305 million in 4Q18. The \$17 million decrease was primarily driven by unfavourable policyholder experience in our retail insurance businesses.

In the U.S., core earnings were \$489 million in 4Q19 compared with \$454 million in 4Q18. The 8% increase was driven by higher sales volumes, tax benefits from the closure of prior tax years, and gains from a variable annuity transfer program were partially offset by actions taken over the last 12 months to improve the capital efficiency of our legacy businesses and unfavourable 4Q19 policyholder experience in life and long-term care insurance compared with gains in 4Q18.

Global Wealth and Asset Management core earnings were \$265 million in 4Q19 compared with \$231 million in 4Q18. The increase of 15% was primarily driven by higher average asset levels.

Corporate and Other core loss excluding core investment gains was \$159 million in 4Q19 compared with \$216 million in 4Q18. The \$57 million decrease in core loss was primarily driven by the favourable impact of markets on seed money investments in new segregated and mutual funds compared to losses in 4Q18, partly offset by lower gains on AFS equities, higher withholding taxes on future U.S. remittances and the non-recurrence of a net release of P&C provisions in 4Q18.

The table below reconciles net income attributed to shareholders to core earnings for the periods presented and provides further details for each of the items excluded from core earnings.

For the quarters ended December 31,

(\$ millions)	2019	2018
Core earnings⁽¹⁾	\$ 1,477	\$ 1,337
Items excluded from core earnings		
Investment-related experience outside of core earnings	182	(130)
Direct impact of equity markets and interest rates and variable annuity guarantee liabilities (see table below)	(389)	(675)
<i>Direct impact of equity markets and variable annuity guarantee liabilities⁽²⁾</i>	125	(723)
<i>Fixed income reinvestment rates assumed in the valuation of policy liabilities⁽³⁾</i>	(583)	112
<i>Sale of AFS bonds and derivative positions in the Corporate and Other segment</i>	69	(64)
Reinsurance transactions	(34)	142
Restructuring charge ⁽⁴⁾	–	(63)
Tax-related items and other ⁽⁵⁾	(8)	(18)
Total items excluded from core earnings	(249)	(744)
Net income (loss) attributed to shareholders	\$ 1,228	\$ 593

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" above.

⁽²⁾ In 4Q19, gains of \$125 million were driven by the equity markets performing better than that assumed in the valuation of our policy liabilities. In 4Q18, losses of \$2,362 million from gross equity exposure were partially offset by gains of \$1,614 million from dynamic hedging experience and \$25 million from macro hedge experience, which resulted in a loss of \$723 million.

⁽³⁾ The \$583 million charge in 4Q19 primarily relates to lower corporate spreads and a decrease in the fair value of interest rate derivatives which more than offset the decrease in liabilities arising from a steepening of the yield curve in the U.S. and Canada. The \$112 million gain in 4Q18 for fixed income reinvestment assumptions was driven by the increases in corporate spreads which resulted in an increase in the reinvestment yields on future fixed income purchases assumed in the measurement of policy liabilities partially offset by a decrease in risk-free rates and increases in swap spreads that resulted in a decrease in the fair value of our swaps.

⁽⁴⁾ The 4Q18 charge of \$63 million is an update to the estimated \$200 million charge that was reported in the second quarter of 2018.

⁽⁵⁾ Tax-related items and other charges in 4Q19 related to legacy transaction fees. The charge in 4Q18 related to integration costs associated with a prior acquisition.

Growth

As at and for the quarters ended December 31,

(\$ millions, unless otherwise stated)

	2019	2018	2017
Asia APE sales	\$ 975	\$ 1,040	\$ 884
Canada APE sales	271	277	222
U.S. APE sales	249	152	153
Total APE sales ⁽¹⁾	1,495	1,469	1,259
Asia new business value	390	402	319
Canada new business value	59	51	48
U.S. new business value	77	48	16
Total new business value ⁽¹⁾	526	501	383
Wealth and asset management gross flows (\$ billions) ⁽¹⁾	32.9	26.3	32.2
Wealth and asset management net flows (\$ billions) ⁽¹⁾	4.9	(9.0)	3.6
Wealth and asset management assets under management and administration (\$ billions) ⁽¹⁾	681.2	608.8	609.0

⁽¹⁾ This item is a non-GAAP measure. See "Performance and Non-GAAP Measures" above.

Sales

APE sales were \$1.5 billion in 4Q19, an increase of 1% compared with 4Q18. In Asia, APE sales decreased 8% as growth in Hong Kong and Asia Other was more than offset by the impact of tax changes to COLI product sales in Japan. In Canada, APE sales decreased 2% as higher Manulife Par and small-case group insurance sales were more than offset by variability in the large-case group insurance market. In the U.S., APE sales increased 64% driven by growth in domestic and international universal life sales. Higher domestic universal life sales included the benefit of sales in advance of anticipated regulatory changes.

New Business Value was \$526 million in 4Q19, an increase of 4% compared with 4Q18. In Asia, NBV decreased 4% to \$390 million, reflecting a decline in Japan sales, partially offset by higher sales in Hong Kong and volume growth and a more favourable business mix in Asia Other. In Canada, NBV increased 16% to \$59 million, driven by higher individual insurance sales and a more favourable business mix in group insurance. In the U.S., NBV increased 61% to \$77 million, primarily as a result of higher sales.

Wealth and Asset Management net inflows were \$4.9 billion in 4Q19 compared with net outflows of \$9.0 billion in 4Q18. Net inflows in Asia were \$0.2 billion in 4Q19 compared with \$1.1 billion in 4Q18. The decrease was driven by higher redemptions and lower gross flows in institutional asset management, partially offset by higher net inflows in retail. Net inflows in Canada were \$1.0 billion in 4Q19 compared with net outflows of \$0.7 billion in 4Q18. The increase was driven by continued sales momentum across the product line-up and lower redemptions in retail, as well as the funding of several large fixed income mandates in institutional asset management. Net inflows in the U.S. were \$3.7 billion in 4Q19 compared with net outflows of \$9.4 billion in 4Q18 and represented the fourth consecutive quarter of growth. The growth compared with 4Q18 was driven by lower redemptions in retail amid improved equity market returns and higher gross flows from all business lines.

Wealth and Asset Management gross flows were \$32.9 billion in 4Q19 compared with \$26.3 billion in 4Q18. Gross flows in Asia were \$5.9 billion in 4Q19 compared with \$5.3 billion in 4Q18. The increase was driven by retail partially offset by lower gross flows in institutional asset management. Gross flows in Canada were \$6.5 billion in 4Q19 compared with \$4.9 billion in 4Q18. The increase was driven by continued sales momentum across the product line-up in retail and the funding of several large fixed income mandates in institutional asset management. Gross flows in the U.S. were \$20.5 billion in 4Q19 compared with \$16.1 billion in 4Q18. The increase was from all business lines.

d. Quarterly Financial Information

The following table provides summary information related to our eight most recently completed quarters:

As at and for the three months ended (\$ millions, except per share amounts or otherwise stated)	Dec 31, 2019	Sept 30, 2019	Jun 30, 2019	Mar 31, 2019	Dec 31, 2018	Sept 30, 2018	Jun 30, 2018	Mar 31, 2018
Revenue								
Premium income								
Life and health insurance	\$ 8,373	\$ 8,309	\$ 7,696	\$ 8,077	\$ 7,724	\$ 7,700	\$ 7,628	\$ 7,300
Annuities and pensions	865	1,026	995	237	(5,892)	(2,599)	1,126	1,025
Net premium income	9,238	9,335	8,691	8,314	1,832	5,101	8,754	8,325
Investment income	4,004	3,932	3,710	3,747	3,278	3,481	3,566	3,235
Realized and unrealized gains and losses on assets supporting insurance and investment contract liabilities ⁽¹⁾	(4,503)	6,592	7,185	8,926	1,113	(3,210)	(1,615)	(5,316)
Other revenue	2,433	2,770	2,634	2,562	2,291	2,671	2,964	2,502
Total revenue	\$ 11,172	\$ 22,629	\$ 22,220	\$ 23,549	\$ 8,514	\$ 8,043	\$ 13,669	\$ 8,746
Income (loss) before income taxes	\$ 1,225	\$ 715	\$ 1,756	\$ 2,524	\$ 359	\$ 1,911	\$ 1,535	\$ 1,714
Income tax (expense) recovery	(89)	(100)	(240)	(289)	(43)	(6)	(246)	(337)
Net income (loss)	\$ 1,136	\$ 615	\$ 1,516	\$ 2,235	\$ 316	\$ 1,905	\$ 1,289	\$ 1,377
Net income (loss) attributed to shareholders	\$ 1,228	\$ 723	\$ 1,475	\$ 2,176	\$ 593	\$ 1,573	\$ 1,262	\$ 1,372
Reconciliation of core earnings to net income attributed to shareholders								
Total core earnings ⁽²⁾	\$ 1,477	\$ 1,527	\$ 1,452	\$ 1,548	\$ 1,337	\$ 1,539	\$ 1,431	\$ 1,303
Other items to reconcile net income attributed to shareholders to core earnings:								
Investment-related experience outside of core earnings	182	(289)	146	327	(130)	312	18	–
Direct impact of equity markets, interest rates and variable annuity guarantee liabilities	(389)	(494)	(144)	249	(675)	(277)	45	50
Change in actuarial methods and assumptions	–	(21)	–	–	–	(51)	–	–
Reinsurance transactions	(34)	–	63	52	142	(65)	12	86
Restructuring charge	–	–	–	–	(63)	–	(200)	–
Tax-related items and other	(8)	–	(42)	–	(18)	115	(44)	(67)
Net income (loss) attributed to shareholders	\$ 1,228	\$ 723	\$ 1,475	\$ 2,176	\$ 593	\$ 1,573	\$ 1,262	\$ 1,372
Basic earnings (loss) per common share	\$ 0.61	\$ 0.35	\$ 0.73	\$ 1.09	\$ 0.28	\$ 0.77	\$ 0.61	\$ 0.67
Diluted earnings (loss) per common share	\$ 0.61	\$ 0.35	\$ 0.73	\$ 1.08	\$ 0.28	\$ 0.77	\$ 0.61	\$ 0.67
Segregated funds deposits	\$ 9,417	\$ 9,160	\$ 9,398	\$ 10,586	\$ 9,212	\$ 9,424	\$ 9,872	\$ 9,728
Total assets (in billions)	\$ 809	\$ 812	\$ 790	\$ 780	\$ 750	\$ 748	\$ 752	\$ 740
Weighted average common shares (in millions)	1,948	1,961	1,965	1,965	1,980	1,984	1,984	1,983
Diluted weighted average common shares (in millions)	1,953	1,965	1,969	1,969	1,983	1,989	1,989	1,989
Dividends per common share	\$ 0.250	\$ 0.250	\$ 0.250	\$ 0.250	\$ 0.250	\$ 0.220	\$ 0.220	\$ 0.220
CDN\$ to US\$1 – Statement of Financial Position	1.2988	1.3243	1.3087	1.3363	1.3642	1.2945	1.3168	1.2894
CDN\$ to US\$1 – Statement of Income	1.3200	1.3204	1.3377	1.3295	1.3204	1.3069	1.2912	1.2647

⁽¹⁾ For fixed income assets supporting insurance and investment contract liabilities and for equities supporting pass-through products and derivatives related to variable hedging programs, the impact of realized and unrealized gains (losses) on the assets is largely offset in the change in insurance and investment contract liabilities.

⁽²⁾ This item is a non-GAAP measure. See “Performance and Non-GAAP Measures” above.

e. Selected Annual Financial Information

As at and for the years ended December 31,
(\$ millions, except per share amounts)

	2019	2018	2017
Revenue			
Asia	\$ 28,673	\$ 19,710	\$ 20,690
Canada	19,609	13,598	11,187
U.S.	24,594	586	21,318
Global Wealth and Asset Management	5,595	5,463	5,200
Corporate and Other	1,099	(385)	(72)
Total revenue	\$ 79,570	\$ 38,972	\$ 58,323
Total assets	\$ 809,130	\$ 750,271	\$ 729,533
Long-term financial liabilities			
Long-term debt	\$ 4,543	\$ 4,769	\$ 4,785
Capital instruments	7,120	8,732	8,387
Total financial liabilities	\$ 11,663	\$ 13,501	\$ 13,172
Dividend per common share	\$ 1.00	\$ 0.91	\$ 0.82
Cash dividend per Class A Share, Series 2	1.1625	1.1625	1.1625
Cash dividend per Class A Share, Series 3	1.125	1.125	1.125
Cash dividend per Class 1 Share, Series 3	0.5445	0.5445	0.5445
Cash dividend per Class 1 Share, Series 4	0.7713	0.6536	0.4918
Cash dividend per Class 1 Share, Series 5	0.9728	0.9728	0.9728
Cash dividend per Class 1 Share, Series 7	1.078	1.078	1.096
Cash dividend per Class 1 Share, Series 9	1.0878	1.0878	1.0969
Cash dividend per Class 1 Share, Series 11	1.1828	1.1371	1.00
Cash dividend per Class 1 Share, Series 13	1.1035	0.9884	0.95
Cash dividend per Class 1 Share, Series 15	0.9608	0.975	0.975
Cash dividend per Class 1 Share, Series 17	0.975	0.975	0.975
Cash dividend per Class 1 Share, Series 19	0.95	0.95	0.95
Cash dividend per Class 1 Share, Series 21	1.40	1.40	1.40
Cash dividend per Class 1 Share, Series 23	1.2125	1.2125	1.298
Cash dividend per Class 1 Share, Series 25 ⁽¹⁾	1.1750	0.9706	–

⁽¹⁾ On February 20, 2018, MFC issued 10 million of Non-cumulative Rate Reset Class 1 Shares Series 25.

f. Differences between IFRS and Hong Kong Financial Reporting Standards

Manulife's Consolidated Financial Statements are presented in accordance with IFRS. IFRS differs in certain respects from Hong Kong Financial Reporting Standards ("HKFRS"). Until IFRS 17 "Insurance Contracts" is issued and becomes effective, IFRS 4 "Insurance Contracts" permits the use of the insurance standard in effect at the time an issuer adopts IFRS. IFRS insurance contract liabilities are valued in Canada under standards established by the Canadian Actuarial Standards Board. In certain interest rate environments, insurance contract liabilities determined in accordance with HKFRS may be higher than those computed in accordance with current IFRS.

g. IFRS and Hong Kong Regulatory Requirements

Insurers in Hong Kong are required by the Insurance Authority to meet minimum solvency requirements. As at December 31, 2019, the Company's business that falls within the scope of these requirements has sufficient assets to meet the minimum solvency requirements under both Hong Kong regulatory requirements and IFRS.

h. Outstanding Common Shares

As at January 31, 2020, MFC had 1,944,896,776 common shares outstanding.

i. Additional Information Available

Additional information relating to Manulife, including MFC's Annual Information Form, is available on the Company's website at www.manulife.com and on SEDAR at www.sedar.com.