Manulife

The Manufacturers Life Insurance Company
Consolidated Financial Statements

For the year ended December 31, 2022

Responsibility for Financial Reporting

The accompanying consolidated financial statements of The Manufacturers Life Insurance Company are the responsibility of management and have been approved by the Board of Directors.

The consolidated financial statements have been prepared by management in accordance with International Financial Reporting Standards and the accounting requirements of the Office of the Superintendent of Financial Institutions, Canada. When alternative accounting methods exist, or when estimates and judgment are required, management has selected those amounts that present the Company's financial position and results of operations in a manner most appropriate to the circumstances.

Appropriate systems of internal control, policies and procedures have been maintained to ensure that financial information is both relevant and reliable. The systems of internal control are assessed on an ongoing basis by management and the Company's internal audit department.

The actuary appointed by the Board of Directors (the "Appointed Actuary") is responsible for ensuring that assumptions and methods used in the determination of policy liabilities are appropriate to the circumstances and that reserves will be adequate to meet the Company's future obligations under insurance and annuity contracts.

The Board of Directors is responsible for ensuring that management fulfills its responsibility for financial reporting and is ultimately responsible for reviewing and approving the consolidated financial statements. These responsibilities are carried out primarily through an Audit Committee of unrelated and independent directors appointed by the Board of Directors.

The Audit Committee meets periodically with management, the internal auditors, the peer reviewers, the external auditors and the Appointed Actuary to discuss internal control over the financial reporting process, auditing matters and financial reporting issues. The Audit Committee reviews the consolidated financial statements prepared by management, and then recommends them to the Board of Directors for approval. The Audit Committee also recommends to the Board of Directors and shareholder the appointment of external auditors and approval of their fees.

The consolidated financial statements have been audited by the Company's external auditors, Ernst & Young LLP, in accordance with Canadian generally accepted auditing standards. Ernst & Young LLP has full and free access to management and the Audit Committee.

Roy Gori
President and Chief Executive Officer

Philip Witherington
Chief Financial Officer

Toronto, Canada
February 15, 2023

Appointed Actuary's Report to the Policyholders and Shareholder

I have valued the policy liabilities and reinsurance recoverables of The Manufacturers Life Insurance Company for its Consolidated Statements of Financial Position as at December 31, 2022 and 2021 and their change in the Consolidated Statements of Income for the years then ended in accordance with actuarial practice generally accepted in Canada, including selection of appropriate assumptions and methods.

In my opinion, the amount of policy liabilities net of reinsurance recoverables makes appropriate provision for all policyholder obligations and the consolidated financial statements fairly present the results of the valuation.

Steven Finch
Appointed Actuary

Toronto, Canada
February 15, 2023

INDEPENDENT AUDITOR'S REPORT

To the Policyholders, Shareholder and Board of Directors of The Manufacturers Life Insurance Company

Opinion

We have audited the consolidated financial statements of The Manufacturers Life Insurance Company (the Company), which comprise the Consolidated Statements of Financial Position as at December 31, 2022 and 2021, and the Consolidated Statements of Income, Consolidated Statements of Comprehensive Income, Consolidated Statements of Changes in Equity and Consolidated Statements of Cash Flows for the years then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Company as at December 31, 2022 and 2021, and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with International Financial Reporting Standards.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Consolidated Financial Statements* section of our report. We are independent of the Company in accordance with the ethical requirements that are relevant to our audit of the consolidated financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information

Management is responsible for the other information. The other information comprises:

- The information, other than the consolidated financial statements and our auditor's report thereon, in the Report to Policyholders.

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

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

The Report to Policyholders is expected to be made available to us after the date of the auditor's report. If based on the work we will perform on this other information, we conclude there is a material misstatement of other information, we are required to report that fact to those charged with governance.

Responsibilities of Management and Those Charged with Governance for the Consolidated Financial Statements

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

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

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

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

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

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

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

Ernst & Young LLP

Chartered Professional Accountants
Licensed Public Accountants

Toronto, Canada
February 15, 2023

Consolidated Statements of Financial Position

As at December 31, (Canadian $ in millions)	2022	2021
Assets		
Cash and short-term securities	**$ 19,081**	$ 22,508
Debt securities	**203,904**	224,139
Public equities	**23,519**	28,067
Mortgages	**54,638**	52,014
Private placements	**47,057**	42,842
Policy loans	**6,894**	6,397
Loans to Bank clients	**2,781**	2,506
Real estate	**13,272**	13,233
Other invested assets	**42,780**	35,304
Total invested assets (note 4)	**413,926**	427,010
Other assets		
Accrued investment income	**2,848**	2,676
Outstanding premiums	**1,448**	1,294
Derivatives (note 5)	**8,638**	17,650
Reinsurance assets (notes 7 and 8)	**47,712**	44,579
Deferred tax assets (note 16)	**5,363**	5,227
Goodwill and intangible assets (note 6)	**10,519**	9,915
Note receivable from related party (note 20)	**86**	505
Miscellaneous	**9,870**	9,566
Total other assets	**86,484**	91,412
Segregated funds net assets (note 22)	**348,562**	399,788
Total assets	**$ 848,972**	$ 918,210
Liabilities and Equity		
Liabilities		
Insurance contract liabilities (note 7)	**$ 371,405**	$ 392,275
Investment contract liabilities (note 8)	**3,248**	3,117
Deposits from Bank clients	**22,507**	20,720
Derivatives (note 5)	**14,366**	10,073
Deferred tax liabilities (note 16)	**2,774**	2,769
Note payable to related party (note 20)	**135**	129
Other liabilities	**17,202**	18,046
	431,637	447,129
Capital instruments (notes 10 and 20)	**1,262**	2,225
Segregated funds net liabilities (note 22)	**348,562**	399,788
Total liabilities	**781,461**	849,142
Equity		
Preferred shares (note 11)	**-**	-
Common shares (note 11)	**43,592**	41,630
Contributed surplus	**5,376**	5,254
Shareholder's retained earnings	**18,117**	16,773
Shareholder's accumulated other comprehensive income (loss) ("AOCI"):		
Pension and other post-employment plans	**(97)**	(114)
Available-for-sale securities	**(6,480)**	840
Cash flow hedges	**(72)**	(245)
Real estate revaluation reserve	**22**	23
Translation of foreign operations	**6,735**	4,446
Total shareholder's equity	**67,193**	68,607
Participating policyholders' equity	**(1,346)**	(1,233)
Non-controlling interests	**1,664**	1,694
Total equity	**67,511**	69,068
Total liabilities and equity	**$ 848,972**	$ 918,210

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

Roy Gori
President and Chief Executive Officer

John Cassaday
Chairman of the Board of Directors

Consolidated Statements of Income

For the years ended December 31, (Canadian $ in millions)		2022		2021
Revenue				
Premium income				
Gross premiums	**$**	**44,102**	$	44,344
Premiums ceded to reinsurers		**(6,249)**		(5,279)
Net premiums		**37,853**		39,065
Investment income (note 4)				
Investment income		**15,224**		15,622
Realized and unrealized gains (losses) on assets supporting insurance and investment contract liabilities and on the macro hedge program		**(45,077)**		(4,003)
Net investment income (loss)		**(29,853)**		11,619
Other revenue (note 13)		**9,203**		11,103
Total revenue		**17,203**		61,787
Contract benefits and expenses				
To contract holders and beneficiaries				
Gross claims and benefits (note 7)		**33,320**		31,110
Increase (decrease) in insurance contract liabilities (note 7)		**(34,971)**		10,719
Increase (decrease) in investment contract liabilities (note 8)		**41**		44
Benefits and expenses ceded to reinsurers		**(7,016)**		(6,805)
(Increase) decrease in reinsurance assets (note 7)		**(673)**		754
Net benefits and claims		**(9,299)**		35,822
General expenses		**7,740**		7,816
Investment expenses (note 4)		**1,863**		1,998
Commissions		**6,260**		6,638
Interest expense		**979**		635
Net premium taxes		**444**		417
Total contract benefits and expenses		**7,987**		53,326
Income before income taxes		**9,216**		8,461
Income tax expense (note 16)		**(1,742)**		(1,312)
Net income	**$**	**7,474**	$	7,149
Net income (loss) attributed to:				
Non-controlling interests	**$**	**(1)**	$	255
Participating policyholders		**(111)**		(448)
Shareholder		**7,586**		7,342
	$	**7,474**	$	7,149

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

Consolidated Statements of Comprehensive Income

For the years ended December 31, (Canadian $ in millions)		**2022**		2021
Net income	**$**	**7,474**	$	7,149
Other comprehensive income (loss) ("OCI"), net of tax:				
Items that may be subsequently reclassified to net income:				
Foreign exchange gains (losses) on:				
Translation of foreign operations		**2,350**		(514)
Net investment hedges		**(61)**		20
Available-for-sale financial securities:				
Unrealized gains (losses) arising during the year		**(7,608)**		(980)
Reclassification of net realized (gains) losses and impairments to net income		**288**		(13)
Cash flow hedges:				
Unrealized gains (losses) arising during the year		**171**		72
Reclassification of realized gains (losses) to net income		**2**		(4)
Share of other comprehensive income (losses) of associates		**(5)**		(1)
Total items that may be subsequently reclassified to net income		**(4,863)**		(1,420)
Items that will not be reclassified to net income:				
Change in actuarial gains (losses) on pension and other post-employment plans		**17**		199
Real estate revaluation reserve		**(1)**		(11)
Total items that will not be reclassified to net income		**16**		188
Other comprehensive income (loss), net of tax		**(4,847)**		(1,232)
Total comprehensive income (loss), net of tax	**$**	**2,627**	$	5,917
Total comprehensive income (loss) attributed to:				
Non-controlling interests	**$**	**(4)**	$	252
Participating policyholders		**(113)**		(449)
Shareholder		**2,744**		6,114

Income Taxes included in Other Comprehensive Income

For the years ended December 31, (Canadian $ in millions)		**2022**		2021
Income tax expense (recovery) on:				
Unrealized gains (losses) on available-for-sale financial securities	**$**	**(1,254)**	$	(181)
Reclassification of net realized (gains) losses and impairments to net income on available-for-sale financial securities		**30**		21
Unrealized gains (losses) on cash flow hedges		**46**		19
Reclassification of realized gains (losses) to net income on cash flow hedges		**1**		(1)
Unrealized foreign exchange gains (losses) on translation of foreign operations		**2**		-
Unrealized foreign exchange gains (losses) on net investment hedges		**(22)**		6
Share of other comprehensive income (loss) of associates		**(1)**		-
Change in actuarial gains (losses) on pension and other post-employment plans		**9**		61
Real estate revaluation reserve		**1**		-
Total income tax expense (recovery)	**$**	**(1,188)**	$	(75)

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

Consolidated Statements of Changes in Equity

For the years ended December 31, (Canadian $ in millions)	2022	2021
Preferred shares		
Balance, beginning and end of year	$ -	$ -
Redeemed	-	-
Balance, end of year	-	-
Common shares		
Balance, beginning of year	41,630	38,430
Issued (note 11)	1,962	3,200
Balance, end of year	43,592	41,630
Contributed surplus		
Balance, beginning of year	5,254	5,123
Stock option expense, net	-	4
Transfer of subsidiaries	147	127
Acquisition of non-controlling interest	(25)	-
Balance, end of year	5,376	5,254
Shareholder's retained earnings		
Balance, beginning of year	16,773	14,431
Net income attributed to shareholder	7,586	7,342
Common share dividends	(6,199)	(5,000)
Acquisition of non-controlling interest	(43)	-
Balance, end of year	18,117	16,773
Shareholder's accumulated other comprehensive income (loss) ("AOCI")		
Balance, beginning of year	4,950	6,178
Change in unrealized foreign exchange gains (losses) on net foreign operations	2,289	(494)
Change in actuarial gains (losses) on pension and other post-employment plans	17	199
Change in unrealized gains (losses) on available-for-sale financial securities	(7,315)	(989)
Change in unrealized gains (losses) on derivative instruments designated as cash flow hedges	173	68
Change in real estate revaluation reserve	(1)	(11)
Share of other comprehensive income (losses) of associates	(5)	(1)
Balance, end of year	108	4,950
Total shareholder's equity, end of year	67,193	68,607
Participating policyholders' equity		
Balance, beginning of year	(1,233)	(784)
Net income (loss) attributed to participating policyholders	(111)	(448)
Other comprehensive income (losses) attributed to participating policyholders	(2)	(1)
Balance, end of year	(1,346)	(1,233)
Non-controlling interests		
Balance, beginning of year	1,694	1,455
Net income attributed to non-controlling interests	(1)	255
Other comprehensive income (losses) attributed to non-controlling interests	(3)	(3)
Contributions (distributions and acquisition), net	(26)	(13)
Balance, end of year	1,664	1,694
Total equity, end of year	$ 67,511	$ 69,068

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

Consolidated Statements of Cash Flows

For the years ended December 31, (Canadian $ in millions)		2022		2021
Operating activities				
Net income	**$**	**7,474**	$	7,149
Adjustments:				
Increase (decrease) in insurance contract liabilities		**(33,413)**		10,719
Increase (decrease) in investment contract liabilities		**41**		44
(Increase) decrease in reinsurance assets excluding coinsurance transactions (note 7)		**159**		754
Amortization of (premium) discount on invested assets		**(32)**		181
Other amortization		**529**		513
Net realized and unrealized (gains) losses and impairment on assets		**47,315**		4,854
Gain on U.S. variable annuity reinsurance transaction (pre-tax) (note7)		**(1,070)**		-
Gain on derecognition of Joint Venture interest during Manulife TEDA acquisition (pre-tax) (notes 3 & 6)		**(95)**		-
Deferred income tax expense (recovery)		**908**		(33)
Stock option expense		**-**		4
Cash provided by operating activities before undernoted items		**21,816**		24,185
Cash decrease due to U.S. variable annuity reinsurance transaction (note 7)		**(1,377)**		-
Changes in policy related and operating receivables and payables		**(2,290)**		(783)
Cash provided by (used in) operating activities		**18,149**		23,402
Investing activities				
Purchases and mortgage advances		**(111,768)**		(120,965)
Disposals and repayments		**93,399**		96,759
Change in investment broker net receivables and payables		**(67)**		(186)
Net cash increase (decrease) from sale (purchase) of subsidiary (notes 3 & 6)		**(182)**		(19)
Cash provided by (used in) investing activities		**(18,618)**		(24,411)
Financing activities				
Redemption of capital instruments (note 10)		**(1,000)**		(350)
Secured borrowings (note 4(f))		**437**		26
Change in repurchase agreements and securities sold but not yet purchased		**(551)**		186
Change in deposits from Bank clients, net		**1,703**		(164)
Lease payments		**(120)**		(124)
Note receivable from related parties		**419**		(133)
Note payable to related parties		**6**		16
Shareholder's dividends paid in cash		**(6,199)**		(5,000)
Common shares issued, net (note 11)		**1,962**		3,200
Contributions from (distributions to, acquisition of) non-controlling interests, net		**(51)**		(13)
Cash provided by (used in) financing activities		**(3,394)**		(2,356)
Cash and short-term securities				
Increase (decrease) during the year		**(3,863)**		(3,365)
Effect of foreign exchange rate changes on cash and short-term securities		**582**		(319)
Balance, beginning of year		**21,844**		25,528
Balance, December 31		**18,563**		21,844
Cash and short-term securities				
Beginning of year				
Gross cash and short-term securities		**22,508**		26,112
Net payments in transit, included in other liabilities		**(664)**		(584)
Net cash and short-term securities, January 1		**21,844**		25,528
End of year				
Gross cash and short-term securities		**19,081**		22,508
Net payments in transit, included in other liabilities		**(518)**		(664)
Net cash and short-term securities, December 31	**$**	**18,563**	$	21,844
Supplemental disclosures on cash flow information				
Interest received	**$**	**12,199**	$	11,384
Interest paid		**890**		600
Income taxes paid		**1,238**		571

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

Notes to Consolidated Financial Statements

(Canadian $ in millions unless otherwise stated)

Note 1 Nature of Operations and Significant Accounting Policies

(a) Reporting entity

The Manufacturers Life Insurance Company ("MLI") is a Canadian life insurance company and a wholly owned subsidiary of Manulife Financial Corporation ("MFC"), a publicly traded company. MLI and its subsidiaries (collectively "Manulife" or the "Company") is a leading financial services group with principal operations in Asia, Canada and the United States. Manulife's international network of employees, agents and distribution partners offers financial protection and wealth management products and services to personal and business clients as well as asset management services to institutional customers. The Company operates as Manulife in Asia and Canada and as John Hancock in the United States.

MLI is domiciled in Canada and incorporated under the Insurance Companies Act (Canada) ("ICA"). These Consolidated Financial Statements have been prepared in accordance with International Financial Reporting Standards ("IFRS") as issued by the International Accounting Standards Board ("IASB") and the accounting requirements of the Office of the Superintendent of Financial Institutions, Canada ("OSFI").

These Consolidated Financial Statements as at and for the year ended December 31, 2022 were authorized for issue by MLI's Board of Directors on February 15, 2023.

(b) Basis of preparation

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 evaluating assumptions used in measuring insurance and investment contract liabilities, assessing assets for impairment, determining pension and other post-employment benefit obligation and expense assumptions, determining income taxes and uncertain tax positions, and estimating fair values 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 these Consolidated Financial Statements are summarized below.

The Company's results and operations have been and may continue to be adversely impacted by COVID-19 and the economic environment. The adverse effects include but are not limited to recessionary economic trends in markets the Company operates in, significant market volatility, increase in credit risk, strain on commodity markets and alternative long duration asset ("ALDA") prices, foreign currency exchange rate volatility, increases in insurance claims, persistency and redemptions, and disruption of business operations. The breadth and depth of these events and their duration contribute additional uncertainty around estimates used in determining the carrying value of certain assets and liabilities included in these Consolidated Financial Statements.

The Company has applied appropriate measurement techniques using reasonable judgment and estimates from the perspective of a market participant to reflect current economic conditions. The impact of these techniques has been reflected in these Consolidated Financial Statements. Changes in the inputs used could materially impact the respective carrying values.

(c) Fair value measurement

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction (not a forced liquidation or distress sale) between market participants at the measurement date; fair value is an exit value.

When available, quoted market prices are used to determine fair value. If quoted market prices are not available, fair value is typically based upon alternative valuation techniques such as discounted cash flows, matrix pricing, consensus pricing services and other techniques. Broker quotes are generally used when external public vendor prices are not available.

The Company has a valuation process in place that includes a review of price movements relative to the market, a comparison of prices between vendors, and a comparison to internal matrix pricing which uses predominately external observable data. Judgment is applied in adjusting external observable data for items including liquidity and credit factors.

The Company categorizes its fair value measurement results according to a three-level hierarchy. The hierarchy prioritizes the inputs used by the Company's valuation techniques based on their reliability. A level is assigned to each fair value measurement based on the lowest level input significant to the fair value measurement in its entirety. The three levels of the fair value hierarchy are defined as follows:

Level 1 – Fair value measurements that reflect unadjusted, quoted prices in active markets for identical assets and liabilities that the Company can access at the measurement date, reflecting market transactions.

Level 2 – Fair value measurements using inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly. These include quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets and liabilities in inactive markets, inputs that are observable that are not prices (such as interest rates, credit risks, etc.) and inputs that are derived from or corroborated by observable market data. Most debt securities are classified within Level 2. Also, included in the Level 2 category are derivative instruments that are priced using models with observable market inputs, including interest rate swaps, equity swaps, credit default swaps and foreign currency forward contracts.

Level 3 – Fair value measurements using significant non-market observable inputs. These include valuations for assets and liabilities that are derived using data, some or all of which is not market observable, including assumptions about risk. Level 3 security valuations include less liquid securities such as real estate properties, other invested assets, timber investments held within segregated funds, certain long-duration bonds and other securities that have little or no price transparency. Certain derivative financial instrument valuations are also included in Level 3.

(d) Basis of consolidation

MLI consolidates the financial statements of all entities it controls, including certain structured entities. Subsidiaries are entities controlled by the Company. The Company has control over an entity when the Company has the power to govern the financial and operating policies of the entity and is exposed to variable returns from its activities which are significant in relation to the total variable returns of the entity and the Company is able to use its power over the entity to affect the Company's share of variable returns of the entity. In assessing control, significant judgment is applied while considering all relevant facts and circumstances. When assessing decision making power over an entity, the Company considers the extent of its rights relative to the management of the entity, the level of voting rights held over the entity which are potentially or presently exercisable, the existence of any contractual management agreements which may provide the Company with power over the entity's financial and operating policies, and to the extent of other parties' ownership in the entity, if any, the possibility for de facto control being present. When assessing variable returns from an entity, the Company considers the significance of direct and indirect financial and non-financial variable returns to the Company from the entity's activities in addition to the proportionate significance of such returns to the total variability of the entity. The Company also considers the degree to which its interests are aligned with those of other parties investing in the entity and the degree to which the Company may act in its own interest while interacting with the entity.

The financial statements of subsidiaries are included in MLI's consolidated results from the date control is established and are excluded from consolidation from the date control ceases. The initial control assessment is performed at inception of the Company's involvement with the entity and is reconsidered if the Company acquires or loses power over key operating and financial policies of the entity; acquires additional interests or disposes of interests in the entity; the contractual arrangements of the entity are amended such that the Company's proportionate exposure to variable returns changes; or if the Company's ability to use its power to affect its variable returns from the entity changes. A change in control may lead to gains or losses on derecognition of a subsidiary when losing control, or on derecognition of previous interests in a subsidiary when gaining control.

The Company's Consolidated Financial Statements have been prepared using uniform accounting policies for like transactions and events in similar circumstances. Intercompany balances, and revenue and expenses arising from intercompany transactions, have been eliminated in preparing the Consolidated Financial Statements.

Non-controlling interests are interests of other parties in the equity of MLI's subsidiaries and are presented within total equity, separate from the equity of MLI's participating policyholders and shareholder. Non-controlling interests in the net income and other comprehensive income ("OCI") of MLI's subsidiaries are included in total net income and total OCI, respectively. An exception to this occurs where the subsidiary's shares are either puttable by the other parties or are redeemable for cash on a fixed or determinable date, in which case other parties' interests in the subsidiary's capital are presented as liabilities of the Company and other parties' interests in the subsidiary's net income and OCI are recorded as expenses of the Company.

The equity method of accounting is used to account for entities over which the Company has significant influence or joint control ("associates" or "joint ventures"), whereby the Company records its share of the associate's or joint venture's net assets and financial results using uniform accounting policies for similar transactions and events. Significant judgment is used to determine whether voting rights, contractual management rights and other relationships with the entity, if any, provide the Company with significant influence or joint control over the entity. Gains and losses on the sale of associates or joint ventures are included in income when realized, while impairment losses are recognized immediately when there is objective evidence of impairment. Gains and losses on commercial transactions with associates or joint ventures are eliminated to the extent of the Company's interest in the equity of the associate or joint venture. Investments in associates and joint ventures are included in other invested assets on the Company's Consolidated Statements of Financial Position.

(e) Invested assets

Invested assets that are considered financial instruments are classified as fair value through profit or loss ("FVTPL"), loans and receivables, or as available-for-sale ("AFS") financial assets. The Company determines the classification of its financial assets at initial recognition. Invested assets are recognized initially at fair value plus, in the case of investments not at FVTPL, directly attributable transaction costs. Invested assets are classified as financial instruments at FVTPL if they are held for trading, if they are designated by management under the fair value option, or if they are designated by management when they include one or more embedded derivatives. Invested assets classified as AFS are non-derivative financial assets that do not fall into any of the other categories described above.

Valuation methods for the Company's invested assets are described above. All fair value valuations are performed in accordance with IFRS 13 "Fair Value Measurement". Disclosure of fair value valuations within the three levels of the fair value hierarchy for invested assets carried at fair value or not carried at fair value on the Consolidated Statements of Financial Position are presented in note 4. Fair value valuations are performed by the Company and by third-party service providers. When third-party service providers are engaged, the Company performs a variety of procedures to corroborate pricing information. These procedures may include, but are not limited to, inquiry and review of valuation techniques, inputs to the valuation and vendor controls reports.

Cash and short-term securities comprise of cash, current operating accounts, overnight bank and term deposits, and debt securities held for meeting short-term cash commitments. Short-term securities are comprised of investments due to mature within one year of the date of purchase. Short-term securities are carried at fair value. Commercial paper and discount notes are classified as Level 2 for fair value disclosure purposes because these securities are typically not actively traded. Net payments in transit and overdraft bank balances are included in other liabilities.

Debt securities are carried at fair value or amortized cost. Debt securities are generally valued by independent pricing vendors using proprietary pricing models incorporating current market inputs for similar instruments with comparable terms and credit quality (matrix pricing). The significant inputs include, but are not limited to, yield curves, credit risks and spreads, prepayment rates and volatility of these inputs. These debt securities are classified as Level 2 for fair value disclosure purposes but can be Level 3 if significant inputs are market unobservable. Realized gains and losses on sale of debt securities and unrealized gains and losses on debt securities designated as FVTPL are recognized in investment income immediately. Unrealized gains and losses on AFS debt securities are recorded in OCI, except for unrealized gains and losses on foreign currency translation which are included in income. Impairment losses on AFS debt securities are recognized in income on an individual security basis when there is objective evidence of impairment. Impairment is considered to have occurred, based on management's judgment, when it is deemed probable that the Company will not be able to collect all amounts due according to the debt security's contractual terms. Debt securities which are classified as held-to-maturity are carried at amortized cost. This includes debt securities with fixed or determinable payments and fixed maturities, for which the Company has both positive intention and ability to hold to maturity, and which the Company has not designated at initial recognition as FVTPL or AFS.

Public equities are comprised of common and preferred equities and mutual fund shares and are carried at fair value. Public equities are generally classified as Level 1 for fair value disclosure purposes, as fair values are normally based on quoted market prices. Realized gains and losses on sale of equities and unrealized gains and losses on equities designated as FVTPL are recognized in investment income immediately. Unrealized gains and losses on AFS equities are recorded in OCI. Impairment losses on AFS equities are recognized in income on an individual security basis when there is objective evidence of impairment. Impairment is considered to have occurred when fair value has declined below cost by a significant amount or for a prolonged period. Significant judgment is applied in determining whether the decline is significant or prolonged.

Mortgages are carried at amortized cost and are classified as Level 3 for fair value disclosure purposes due to the lack of market observability of certain significant valuation inputs. Realized gains and losses are recorded in investment income immediately. Impairment losses are recorded on mortgages when there is no longer reasonable assurance as to the timely collection of the full amount of principal and interest and are measured based on the discounted value of expected future cash flows at the original effective interest rates inherent in the mortgage. Expected future cash flows of impaired mortgages are typically determined with reference to the fair value of collateral security underlying the mortgage, net of expected costs of realization and including any applicable insurance recoveries. Significant judgment is applied in the determination of impairment including the timing and amount of future collections.

The Company accounts for insured and uninsured mortgage securitizations as secured financing transactions since the criteria for sale accounting are not met. For these transactions, the Company continues to recognize the mortgages and records liabilities within other liabilities for the amounts owed at maturity. Interest income from these mortgages and interest expense on the borrowings are recorded using the effective interest rate method.

Private placements, which include corporate loans for which there is no active market, are carried at amortized cost and are generally classified as Level 2 for fair value disclosure purposes or Level 3 if significant inputs are market unobservable. Realized gains and losses are recorded in income immediately. Impairment losses are recorded on private placements when there is no longer assurance as to the timely collection of the full amount of principal and interest. Impairment is measured based on the discounted value of expected future cash flows at the original effective interest rate inherent in the loan. Significant judgment is applied in the determination of impairment including the timing and amount of future collections.

Policy loans are carried at an amount equal to their unpaid balances and are classified as Level 2 for fair value disclosure purposes. Policy loans are fully collateralized by the cash surrender value of the underlying policies.

Loans to Manulife Bank of Canada (“Manulife Bank” or “Bank”) clients are carried at amortized cost and are classified as Level 2 for fair value disclosure purposes. A loan to a Bank client is considered impaired when there is objective evidence of impairment because of one or more loss events that have occurred after initial recognition, with a negative impact on the estimated future cash flows of the loan.

Once established, allowances for impairment of mortgages, private placements and loans to Bank clients are reversed only if the conditions that caused the impairment no longer exist. Reversals of impairment charges on AFS debt securities are only recognized in income to the extent that subsequent increases in fair value can be attributed to events after the impairment loss being recorded. Impairment losses for AFS equity instruments are not reversed through income. On disposition of an impaired asset, any allowance for impairment is released.

In addition to impairments and provisions for loan losses (recoveries) reported in investment income, the measurement of insurance contract liabilities, via investment return assumptions, includes expected future credit losses on fixed income investments. Refer to note 7(d).

Interest income is recognized on debt securities, mortgages, private placements, policy loans, loans to Bank clients and certain other invested assets as it accrues and is calculated using the effective interest rate method. Premiums, discounts and transaction costs are amortized over the life of the underlying investment using the effective yield method for all debt securities as well as mortgages and private placements.

The Company records purchases and sales of invested assets on a trade date basis. Loans originated by the Company are recognized on a settlement date basis.

Real estate consists of both own use property and investment property. Own use property, held for use for the Company’s operations, is carried at cost less accumulated depreciation and any accumulated impairment losses. Depreciation is calculated based on the cost of an asset less its residual value and is recognized in income on a straight-line basis over the estimated useful life ranging from 30 to 60 years. Impairment losses are recorded in income to the extent the recoverable amount is less than the carrying amount. Where own use property is included in assets backing insurance contract liabilities, the fair value of the property is used in the valuation of insurance contract liabilities. Fair value of own use property is determined using the same processes as for investment property, described below. Own use property is classified as Level 3 for fair value disclosure purposes.

An investment property is a property held to earn rental income, for capital appreciation, or both. Investment properties are measured at fair value, with changes in fair value recognized in income. Fair value is determined using external appraisals that are based on the highest and best use of the property. The valuation techniques include discounted cash flows, the direct capitalization method as well as comparable sales analysis and include both observable and unobservable inputs. Inputs include existing and assumed tenancies, market data from recent comparable transactions, future economic outlook and market risk assumptions, capitalization rates and internal rates of return. Investment properties are classified as Level 3 for fair value disclosure purposes.

When a property changes from own use to investment property, any gain or loss arising on the remeasurement of the property to fair value at the date of transfer is recognized in OCI, to the extent that it is not reversing a previous impairment loss. Reversals of impairment losses are recognized in income.

Other invested assets include private equity and property investments held in infrastructure and timber, as well as in agriculture and oil and gas sectors. Private equity investments are accounted for as associates or joint ventures using the equity method (as described in note 1(d) above) or are classified as FVTPL or AFS and carried at fair value. Investments in oil and gas exploration and evaluation activities are measured on the cost basis using the "successful efforts" method. Timber and agriculture properties are measured at fair value with changes in fair value recognized in income, except for buildings, equipment and bearer plants which are measured at amortized cost. The fair value of other invested assets is determined using a variety of valuation techniques as described in note 4. Other invested assets that are measured or disclosed at fair value are primarily classified as Level 3.

Other invested assets also include investments in leveraged leases, which are accounted for using the equity method. The carrying value under the equity method reflects the amortized cost of the lease receivable and related non-recourse debt using the effective yield method.

(f) Goodwill and intangible assets

Goodwill represents the difference between the fair value of purchase consideration of an acquired business and the Company's proportionate share of the net identifiable assets acquired. It is initially recorded at cost and subsequently measured at cost less any accumulated impairment.

Goodwill is tested for impairment at least annually and whenever events or changes in circumstances indicate that the carrying amounts may not be recoverable at the cash generating unit ("CGU") or group of CGUs level. The Company allocates goodwill to CGUs or group of CGUs for impairment testing at the lowest level within the entity where the goodwill is monitored for internal management purposes. The allocation is made to those CGUs or group of CGUs that are expected to benefit from the business combination in which the goodwill arose. Any potential impairment of goodwill is identified by comparing the recoverable amount with the carrying value of a CGU or group of CGUs. Goodwill is reduced by the amount of deficiency, if any. If the deficiency exceeds the carrying amount of goodwill, the carrying values of the remaining assets in the CGU or group of CGUs are subject to being reduced by the remaining deficiency on a pro-rata basis.

The recoverable amount of a CGU or group of CGUs is the higher of the estimated fair value less costs to sell or the value-in-use of the CGU or group of CGUs. In assessing value-in-use, estimated future cash flows are discounted using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the CGU or group of CGUs. In some cases, the most recent detailed calculation made in a prior period of a recoverable amount is used in the current period impairment testing. This is the case only if there are no significant changes to the CGU or group of CGUs, the likelihood of impairment is remote based on the analysis of current events and circumstances, and the most recently calculated recoverable amount substantially exceeded the current carrying amount of the CGU or group of CGUs.

Intangible assets with indefinite useful lives include the John Hancock brand name, certain investment management contracts and certain agricultural water rights. The indefinite useful life assessment for the John Hancock brand name is based on the brand name being protected by indefinitely renewable trademarks in markets where branded products are sold, and for certain investment management contracts based on the ability to renew these contracts indefinitely. In addition, there are no legal, regulatory or contractual provisions that limit the useful lives of these intangible assets. Certain agricultural water rights are held in perpetuity. An intangible asset with an indefinite useful life is not amortized but is subject to an annual impairment test which is performed more frequently if an indication that it is not recoverable arises.

Intangible assets with finite useful lives include acquired distribution networks, customer relationships, capitalized software, and certain investment management contracts and other contractual rights. Distribution networks, customer relationships, and other finite life intangible assets are amortized over their estimated useful lives, six to 68 years, either based on straight-line or in relation to other asset consumption metrics. Software intangible assets are amortized on a straight-line basis over their estimated useful lives of three to 10 years. Finite life intangible assets are assessed for indicators of impairment at each reporting period. If indications of impairment arise, these assets are tested for impairment.

(g) Miscellaneous assets

Miscellaneous assets include assets held in a rabbi trust with respect to unfunded defined benefit obligations, defined benefit assets, if any, deferred acquisition costs and capital assets. Rabbi trust assets are carried at fair value. Defined benefit assets carrying value is explained in note 1(o). Deferred acquisition costs are carried at cost less accumulated amortization and are amortized over the period redemption fees may be charged or over the period revenue is earned. Capital assets are carried at cost less accumulated amortization computed on a straight-line basis over their estimated useful lives, which vary from two to 10 years.

(h) Segregated funds

The Company manages segregated funds on behalf of policyholders, which are presented as segregated fund net assets with offsetting segregated funds net liabilities to policyholders in the amount of their account balances. Amounts invested by the Company in segregated funds for seed purposes are presented within invested asset categories based on the nature of the underlying investments. The investment returns on these funds are passed directly to policyholders. In some cases, the Company has provided guarantees associated with these funds.

Segregated funds net assets are measured at fair value and include investments in mutual funds, debt securities, equities, cash, short-term investments and other investments. With respect to the consolidation requirement of IFRS, in assessing the Company's degree of control over the underlying investments, the Company considers the scope of its decision-making rights, the rights held by other parties, its remuneration as an investment manager and its exposure to variability of returns from the investments. The Company has determined that it does not have control over the underlying investments as it acts as an agent on behalf of segregated fund policyholders.

The methodology applied to determine the fair value of investments held in segregated funds is consistent with that applied to invested assets held by the general fund, as described above in note 1(e). Segregated funds liabilities are measured based on the value of the segregated funds net assets. Investment returns on segregated funds assets belong to policyholders and the Company does not bear the risk associated with these assets outside of guarantees offered on certain variable life and annuity products, for which the underlying investments are held within segregated funds. Accordingly, investment income earned by segregated funds and expenses incurred by segregated funds are offset and are not separately presented in the Consolidated Statements of Income. Fee income earned by the Company for managing and administering the segregated funds is included in other revenue.

Liabilities related to guarantees associated with certain segregated funds, as a result of certain variable life and annuity contracts, are recorded within the Company's insurance contract liabilities. The Company holds assets supporting these guarantees in the general fund, which are included in invested assets according to their investment type.

(i) Insurance and investment contract liabilities

Most contracts issued by the Company are considered insurance, investment or service contracts. Contracts under which the Company accepts significant insurance risk from a policyholder are classified as insurance contracts in the Consolidated Financial Statements. A contract is considered to have significant insurance risk if, and only if, an insured event could cause an insurer to make significant additional payments in any scenario, excluding scenarios that lack commercial substance at the inception of the contract. Contracts under which the Company does not accept significant insurance risk are either classified as investment contracts or considered service contracts and are accounted for in accordance with IAS 39 "Financial Instruments: Recognition and Measurement" or IFRS 15 "Revenue from Contracts with Customers", respectively.

Once a contract has been classified as an insurance contract it remains an insurance contract even if the insurance risk reduces significantly. Investment contracts can be reclassified as insurance contracts if insurance risk subsequently becomes significant.

Insurance contract liabilities, net of reinsurance assets, represent the amount which, together with estimated future premiums and net investment income, will be sufficient to pay estimated future benefits, policyholder dividends and refunds, taxes (other than income taxes) and expenses on policies in-force. Insurance contract liabilities are presented gross of reinsurance assets on the Consolidated Statements of Financial Position. The Company's Appointed Actuary is responsible for determining the amount of insurance contract liabilities in accordance with standards established by the Canadian Institute of Actuaries. Insurance contract liabilities, net of reinsurance assets, have been determined using the Canadian Asset Liability Method ("CALM") as permitted by IFRS 4 "Insurance Contracts". Refer to note 7.

Investment contract liabilities include contracts issued to retail and institutional investors that do not contain significant insurance risk. Investment contract liabilities and deposits are measured at amortized cost or at FVTPL by election. The election reduces accounting mismatches between FVTPL assets supporting these contracts and the related contract liabilities. Investment contract liabilities are derecognized when the contract expires, is discharged or is cancelled.

Derivatives embedded within insurance contracts are separately accounted for as derivatives if they are not considered to be closely related to the host insurance contract and do not meet the definition of an insurance contract. These embedded derivatives are presented separately in other assets or other liabilities and are measured at FVTPL.

(j) Reinsurance assets

The Company uses reinsurance in the normal course of business to manage its risk exposure. Insurance ceded to a reinsurer does not relieve the Company from its obligations to policyholders. The Company remains liable to its policyholders for the portion reinsured to the extent that any reinsurer does not meet its obligations for reinsurance ceded to it under a reinsurance agreement.

Reinsurance assets represent the benefit derived from reinsurance agreements in-force at the reporting date, considering the financial condition of the reinsurer. Amounts recoverable from reinsurers are estimated in accordance with the terms of the relevant reinsurance contract.

Gains or losses on reinsurance transactions are recognized in income immediately on the transaction date and are not amortized. Premiums ceded and claims reimbursed are presented on a gross basis on the Consolidated Statements of Income. Reinsurance assets are not offset against the related insurance contract liabilities and are presented separately on the Consolidated Statements of Financial Position. Refer to note 7(a).

(k) Other financial instruments accounted for as liabilities

The Company issues a variety of other financial instruments classified as liabilities, including notes payable, term notes, senior notes, senior debentures, subordinated notes, surplus notes and preferred shares. These financial liabilities are measured at amortized cost, with issuance costs deferred and amortized using the effective interest rate method.

(l) Income taxes

The provision for income taxes is calculated based on income tax laws and income tax rates substantively enacted as at the date of the Consolidated Statements of Financial Position. The income tax provision is comprised of current income taxes and deferred income taxes. Current and deferred income taxes relating to items recognized in OCI and directly in equity are similarly recognized in OCI and directly in equity, respectively.

Current income taxes are amounts expected to be payable or recoverable for the current year and any adjustments to taxes payable in respect of previous years.

Deferred income taxes are provided for using the liability method and result from temporary differences between the carrying values of assets and liabilities and their respective tax bases. Deferred income taxes are measured at the substantively enacted tax rates that are expected to be applied to temporary differences when they reverse.

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. Deferred tax assets and liabilities are offset if there is a legally enforceable right to offset current tax assets and liabilities and they relate to income taxes levied by the same tax authority on the same taxable entity.

Deferred tax liabilities are recognized for all taxable temporary differences, except in respect of taxable temporary differences associated with investments in subsidiaries, associates and joint ventures, where the timing of the reversal of the temporary differences can be controlled and it is probable that the temporary differences will not reverse in the foreseeable future.

The Company records liabilities for uncertain tax positions if it is probable that the Company will make a payment on tax positions due to examinations by tax authorities. These provisions are measured at the Company's best estimate of the amount expected to be paid. Provisions are reversed to income in the period in which management assesses they are no longer required or determined by statute.

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 current income taxes and deferred 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 year. The Company may be required to change its provision for income taxes or deferred income tax balances when the ultimate deductibility of certain items is successfully challenged by taxing authorities, or if estimates used in determining the amount of deferred tax balances to recognize change significantly, or when receipt of new information indicates the need for adjustment in the amount of deferred income taxes to be recognized. 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 taxes, deferred tax balances and the effective tax rate. Any such changes could materially affect the amounts reported in the Consolidated Financial Statements in the period these changes occur.

(m) Foreign currency translation

Items included in the financial statements of each of the Company's subsidiaries, joint ventures and associates are measured by each entity using the currency of the primary economic environment in which the entity operates (the "functional currency"). If their functional currency is other than Canadian dollar, these entities are foreign operations of the Company.

Transactions in a foreign currency are translated to the functional currency at the exchange rate prevailing at the date of the transaction. Assets and liabilities denominated in foreign currencies are translated to the functional currency at the exchange rate in effect at the reporting date. Revenue and expenses denominated in foreign currencies are translated at the average exchange rate prevailing during the quarter reported. Exchange gains and losses are recognized in income except for translation of net investments in foreign operations and the results of hedging these positions, and for non-monetary items designated as AFS. These foreign exchange gains and losses are recognized in OCI until such time that the foreign operation or non-monetary item is disposed of or control or significant influence over it is lost.

The Consolidated Financial Statements are presented in Canadian dollars. The financial statements of the Company's foreign operations are translated from their functional currencies to Canadian dollars; assets and liabilities are translated at the exchange rate at the reporting date, and revenue and expenses are translated using the average exchange rates for the period. Foreign exchange gains and losses on these translations are recognized in OCI, subject to reclassification to income upon disposal of a foreign operation.

(n) Stock-based compensation

The Company provides stock-based compensation to certain employees and directors as described in note 14. Compensation expense of equity instruments granted is accrued based on the best estimate of the number of instruments expected to vest, with revisions made to that estimate if subsequent information indicates that actual forfeitures are likely to differ from initial forfeiture estimates, unless forfeitures are due to market-based conditions.

Stock options are expensed with a corresponding increase in contributed surplus. Restricted share units and deferred share units are expensed with a corresponding liability accrued based on the market value of MFC's common shares at the end of each quarter. Performance share units are expensed with a corresponding liability accrued based on specific performance conditions and the market value of MFC's common shares at the end of each quarter. The change in the value of the awards resulting from changes in the market value of MFC's common shares or changes in the specific performance conditions and credited dividends is recognized in income, offset by the impact of total return swaps used to manage the variability of the related liabilities.

Stock-based compensation cost is recognized over the applicable vesting period, unless the employee is eligible to retire at the time of grant or will be eligible to retire during the vesting period. Compensation costs attributable to stock options, restricted share units, and performance share units granted to employees who are eligible to retire on the grant date or who will become eligible to retire during the vesting period, are recognized at the grant date or over the period from the grant date to the date of retirement eligibility, respectively.

The Company's contributions to the Global Share Ownership Plan ("GSOP") (refer to note 14), are expensed as incurred. Under the GSOP, subject to certain conditions, the Company will match a percentage of an employee's eligible contributions to certain maximums. All contributions are used by the plan's trustee to purchase MFC common shares in the open market on behalf of participating employees.

(o) 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 and disability welfare plans that are typically not funded.

The Company's obligation in respect of defined benefit pension and other post-employment benefits is calculated for each plan as the estimated present value of future benefits that eligible employees have earned in return for their service up to the reporting date using the projected benefit method. The discount rate used is based on the yield, as at the reporting date, of high-quality corporate debt securities that have approximately the same term as the benefit obligations and that are denominated in the same currency in which the benefits are expected to be paid.

To determine the Company's net defined benefit asset or liability, the fair value of plan assets is deducted from the defined benefit obligations. When this calculation results in a surplus, the asset that can be recognized is limited to the present value of future economic benefit available in the form of future refunds from the plan or reductions in future contributions to the plan (the asset limit). Defined benefit assets are included in other assets and defined benefit liabilities are included in other liabilities.

Changes in the net defined benefit asset or liability due to re-measurement of pension and retiree welfare plans are recorded in OCI in the period in which they occur and are not reclassified to income in subsequent periods. They consist of actuarial gains and losses, the impact of the asset limit, if any, and the return on plan assets, excluding amounts included in net interest income or expense. Changes in the net defined benefit asset or liability due to re-measurement of disability welfare plans are recorded in income in the period in which they occur.

The cost of defined benefit pension plans is recognized over the employee's years of service to retirement while the cost of retiree welfare plans is recognized over the employee's years of service to their date of full eligibility. The net benefit cost for the year is recorded in income and is calculated as the sum of the service cost in respect of the fiscal year, the net interest income or expense and any applicable administration expenses, plus past service costs or credits resulting from plan amendments or curtailments. The net interest income or expense is determined by applying the discount rate to the net defined benefit asset or liability. The current year cost of disability welfare plans is the year-over-year change in the defined benefit obligation, including any actuarial gains or losses.

The cost of defined contribution plans is the contribution provided by the Company and is recorded in income in the periods during which services are rendered by employees.

(p) Derivative and hedging instruments

The Company uses derivative financial instruments ("derivatives") including swaps, forward and futures agreements, and options to manage current and anticipated exposures to changes in interest rates, foreign exchange rates, commodity prices and equity market prices, and to replicate permissible investments. Derivatives embedded in other financial instruments are separately recorded as derivatives when their economic characteristics and risks are not closely related to those of the host instrument, the terms of the embedded derivative are the same as those of a standalone derivative and the host instrument itself is not recorded at FVTPL. Derivatives which are separate financial instruments are recorded at fair value, and those with unrealized gains reported as derivative assets and those with unrealized losses reported as derivative liabilities.

A determination is made for each derivative as to whether to apply hedge accounting. Where hedge accounting is not applied, changes in the fair value of derivatives are recorded in investment income. Refer to note 4(c).

Where the Company has elected to apply hedge accounting, a hedging relationship is designated and documented at inception. Hedge effectiveness is evaluated at inception and throughout the term of the hedge. Hedge accounting is only applied when the Company expects that the hedging relationship will be highly effective in achieving offsetting changes in fair value or changes in cash flows attributable to the risk being hedged. The assessment of hedge effectiveness is performed at the end of each reporting period both prospectively and retrospectively. When it is determined that a hedging relationship is no longer effective, or the hedging instrument or the hedged item has been sold or terminated, the Company discontinues hedge accounting prospectively. In such cases, if the derivatives are not sold or terminated, any subsequent changes in fair value of the derivatives are recognized in investment income.

For derivatives that are designated as hedging instruments, changes in fair value are recorded according to the nature of the risks being hedged, as discussed below.

In a fair value hedging relationship, changes in fair value of the hedging instruments are recorded in investment income, offsetting changes in fair value of the hedged items, which would otherwise not be carried at fair value. Hedge ineffectiveness is recognized in investment income and arises from differences between changes in the fair values of hedging instruments and hedged items. When hedge accounting is discontinued, the carrying value of the hedged item is no longer adjusted and the cumulative fair value adjustments are amortized to investment income over the remaining term of the hedged item unless the hedged item is sold, at which time the balance is recognized immediately in investment income.

In a cash flow hedging relationship, the effective portion of the change in the fair value of the hedging instrument is recorded in OCI while the ineffective portion is recognized in investment income. Gains and losses in accumulated other comprehensive income ("AOCI") are recognized in income during the same periods that the variability in the hedged cash flows or the hedged forecasted transactions are recognized in income. The reclassifications from AOCI are made to investment income, except for total return swaps that hedge stock-based compensation awards, which are reclassified to general expenses.

Gains and losses on cash flow hedges in AOCI are reclassified immediately to investment income when the hedged item is sold or the forecasted transaction is no longer expected to occur. When a hedge is discontinued, but the hedged forecasted transaction is expected to occur, the amounts in AOCI are reclassified to investment income in the periods during which variability in the cash flows hedged or the hedged forecasted transaction is recognized in income.

In a net investment in foreign operations hedging relationship, gains and losses relating to the effective portion of the hedge are recorded in OCI. Gains and losses in AOCI are recognized in income during the periods when gains or losses on the underlying hedged net investment in foreign operations are recognized in income upon disposal of the foreign operation.

(q) Premium income and related expenses

Gross premiums for all types of insurance contracts, and contracts with limited mortality or morbidity risk, are generally recognized as revenue when due. Premiums are reported gross of reinsurance ceded (refer to note 7).

(r) Revenue from service contracts

The Company recognizes revenue from service contracts in accordance with IFRS 15. The Company's service contracts generally impose single performance obligations, each consisting of a series of similar related services for each customer. Revenue is recorded as performance obligations are satisfied over time because the customers simultaneously receive and consume the benefits of the services rendered, measured using an output method. Revenue for variable consideration is recognized to the extent that it is highly probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty is subsequently resolved. Refer to note 13.

Note 2 Accounting and Reporting Changes

(a) Changes in accounting and reporting policy

(i) Annual Improvements 2018 – 2020 Cycle

Annual Improvements 2018–2020 Cycle was issued in May 2020 and is effective on or after January 1, 2022. The IASB issued four minor amendments to different standards as part of the Annual Improvements process, to be applied prospectively. Adoption of these amendments did not have a significant impact on the Company's Consolidated Financial Statements.

(ii) Amendments to IFRS 3 "Business Combinations"

Amendments to IFRS 3 "Business Combinations" were issued in May 2020, and are effective on or after January 1, 2022, with earlier application permitted. The amendments update references within IFRS 3 to the 2018 Conceptual Framework and require that the principles in IAS 37 "Provisions, Contingent Liabilities and Contingent Assets" be used to identify liabilities and contingent assets arising from a business combination. Adoption of these amendments did not have a significant impact on the Company's Consolidated Financial Statements.

(iii) Amendments to IAS 37 "Provisions, Contingent Liabilities and Contingent Assets"

Amendments to IAS 37 "Provisions, Contingent Liabilities and Contingent Assets" were issued in May 2020, and are effective on or after January 1, 2022, with earlier application permitted. The amendments address identifying onerous contracts and specify the cost of fulfilling a contract which includes all costs directly related to the contract. These include incremental direct costs and allocations of other costs that relate directly to fulfilling the contract. Adoption of these amendments did not have a significant impact on the Company's Consolidated Financial Statements.

(b) Future accounting and reporting changes

(i) IFRS 17 "Insurance Contracts"

IFRS 17 "Insurance Contracts" was issued in May 2017 to be effective for years beginning on January 1, 2021. Amendments to IFRS 17 "Insurance Contracts" were issued in June 2020 and include a two-year deferral of the effective date. IFRS 17 as amended, is effective for years beginning on January 1, 2023, to be applied retrospectively. If full retrospective application to a group of contracts is impracticable the modified retrospective or fair value methods may be used. The standard replaced IFRS 4 "Insurance Contracts" and therefore replaced the Canadian Asset Liability Method ("CALM") and materially changed the recognition and measurement of insurance contracts and the corresponding presentation and disclosures in the Company's Consolidated Financial Statements.

Narrow-scope amendments to IFRS 17 "Insurance Contracts" were issued in December 2021 and were effective on initial application of IFRS 17 and IFRS 9 "Financial Instruments" which the Company has adopted on January 1, 2023. The amendments reduce accounting mismatches between insurance contract liabilities and financial assets in scope of IFRS 9 within comparative prior periods when initially applying IFRS 17 and IFRS 9. The amendments allow insurers to present comparative information on financial assets as if IFRS 9 were fully applicable during the comparative period. The amendments do not permit application of IFRS 9 hedge accounting principles to the comparative period.

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

- Under IFRS 17 new business gains are recorded on the Consolidated Statements of Financial Position (in the Contractual Service Margin ("CSM") component of the insurance contract liability) and amortized into income as services are provided. New business losses are recorded into income immediately. Under CALM, both new business gains and new business losses were recognized in income immediately.
- Under IFRS 17 the Company aggregates insurance contracts that are subject to similar risks and managed together into portfolios. Since new business gains and losses have different accounting treatments, insurance contracts are further aggregated into groups by profitability and issuance period to limit offsetting of new business gains and losses. Such aggregation of contracts into groups is required on initial recognition and not reassessed subsequently. Under CALM, new business gains and new business losses offset each other in income.
- Under IFRS 17 the discount rate used to estimate the present value of insurance contract liabilities is based on the characteristics of the liabilities. Under CALM, the rates of returns for current and projected assets supporting insurance contract liabilities were used to value the liabilities. The difference in the discount rate approach also impacts the timing of investment results. Under IFRS 17, the impact of investing activities will emerge into earnings over the life of the assets. Under CALM, the impact of investing activities was capitalized into reserves and therefore earnings in the period they occurred.

- Under IFRS 17 the insurance contract liability discount rate is not related to the expected return on Alternative Long-Duration Assets ("ALDA") and public equity assets, and as a result, the earnings sensitivity of a change in return assumptions for ALDA and public equity assets will be significantly reduced.
- Under IFRS 17 the Company has elected the option to record changes in insurance contract liabilities arising from changes in interest rates through other comprehensive income, for substantially all insurance products, and classify debt instruments supporting these insurance contract liabilities as fair value through other comprehensive income ("FVOCI") under IFRS 9. Under CALM, changes in insurance contract liabilities were recorded in income and supporting debt instruments were classified as FVTPL.
- Under IFRS 17 the Company separates specific embedded derivatives and distinct investment components from insurance contracts and accounts for them under IFRS 9. Under IFRS 4 the treatment of embedded derivatives is consistent with IFRS 17, however under IFRS 4 the Company did not separate deposit components as this was not required by the standard.
- Under IFRS 17 insurance contracts with different features are measured by one of the three measurement models: General Measurement Model ("GMM"), Premium Allocation Approach ("PAA") and Variable Fee Approach ("VFA"). Under IFRS 4, insurance contracts were generally valued by one measurement model, although an unearned premium reserve method similar to PAA was allowed and used by Manulife for certain short duration / annually renewable business.

In addition, there are significant changes to presentation and disclosure of the financial statements. The following outlines some of the key presentation and disclosure changes:

- Consolidated Statements of Financial Position: Under IFRS 17 the Company presents portfolios of insurance and reinsurance contracts issued separately from portfolios of reinsurance contracts held, and portfolios in asset position are further presented separately from portfolios in liability position. Under CALM, contracts were not split and presented by asset and liability position.
- Consolidated Statements of Comprehensive Income: Under IFRS 17 the Company separately presents insurance revenue, insurance service expense, insurance finance income or expenses, and income or expenses from reinsurance contracts held. Under CALM the Company reported premium income, gross claims and benefits, changes in insurance contract liabilities, benefits and expenses ceded to reinsurers, and changes in reinsurance assets.

IFRS 17 Transition

The Company is required to prepare an opening balance sheet as at January 1, 2022, the date of transition to IFRS 17, which forms the starting point for its financial reporting in accordance with IFRS 17. Any differences between the carrying value and the presentation of assets, liabilities and equity determined in accordance with CALM and IFRS 17, as at January 1, 2022, will be recorded in opening retained earnings and accumulated other comprehensive income.

On the transition date, January 1, 2022, the Company;

- Identified, recognized, and measured each group of contracts as if IFRS 17 had always applied, unless it was impracticable (see Full Retrospective Approach and Fair Value Approach below);
- Identified, recognized, and measured assets for insurance acquisition cash flows as if IFRS 17 had always applied, unless it was impracticable. However, no recoverability assessment was performed before the transition date;
- Derecognized any balances that would not exist had IFRS 17 always applied;
- Measured own use real estate properties that were underlying items of insurance contracts with direct participation features at fair value; and
- Recognized any resulting net difference in equity.

<u>Full Retrospective Approach</u>

The Company has adopted IFRS 17 retrospectively unless the full retrospective approach was deemed impracticable. The Company has applied the full retrospective approach to most contracts issued on or after January 1, 2021, except for participating insurance contracts and variable annuity contracts for which the fair value approach was used.

Fair Value Approach

The Company has applied the fair value approach to all insurance contracts issued prior to January 1, 2021, as obtaining reasonable and supportable information to apply the full retrospective approach was deemed impracticable.

IFRS 17 allows the use of the fair value approach for groups of insurance contracts with direct participation features if the risk mitigation option is applied prospectively from the transition date and the Company used derivatives, reinsurance contracts held or non-derivative financial instruments held at FVTPL to mitigate financial risk on these groups of contracts. With these conditions met, the Company has elected to apply the fair value approach to participating insurance contracts and variable annuity contracts issued on or after January 1, 2021.

Under the fair value approach, the Company has determined the CSM of the GMM and VFA liabilities for remaining coverage at the transition date as the difference between the fair value of the groups of insurance contracts and the fulfilment cash flows measured at that date. In determining the fair value, the Company has applied the requirements of IFRS 13 "Fair Value Measurement", except for the demand deposit floor requirement. The Company used the income approach to determine the fair value of the insurance contracts at the transition date, in which future cash flows are discounted to a single amount that reflects current market expectations about those future amounts.

To determine groups of insurance contracts under the fair value approach the Company has aggregated contracts issued more than one year apart as it did not have reasonable and supportable information to divide groups into those including only contracts issued within one year or less.

For the application of the fair value approach, the Company has used reasonable and supportable information available at the transition date in order to:

- Identify groups of insurance contracts;
- Determine whether an insurance contract meets the definition of an insurance contract with direct participation features;
- Identify discretionary cash flows for insurance contracts without direct participation features; and
- Determine whether an investment contract meets the definition of an investment contract with discretionary participation features.

For insurance contracts where the fair value approach was applied, the discount rate used to determine the fair value of the group of insurance contracts was determined at the transition date. For cash flows of insurance contracts that do not vary based on the returns on underlying items, the Company determines discount rates by adjusting a liquid risk-free yield curve to reflect the differences between the liquidity characteristics of the financial instruments that underlie the rates observed in the market and the liquidity characteristics of the insurance contracts (a bottom-up approach).

Other Comprehensive Income at Transition

Under IFRS 17 changes in the carrying amount of insurance contracts arising from the effect of and changes in the time value of money and in financial risk are presented as insurance finance income or expense (except for some changes for insurance contracts with direct participation features under certain circumstances). Under IFRS 17 the Company has the option to present all insurance finance income or expense in profit or loss or disaggregated between profit or loss and OCI (the "OCI option"). The Company has elected the OCI option and determined the cumulative OCI balance at transition as follows:

- For some GMM and PAA groups of contracts where the fair value approach was applied, the cumulative OCI was set retrospectively only if reasonable and supportable information was available, otherwise it was set to zero at the transition date.
- For GMM groups of contracts where the full retrospective approach was applied, the cumulative balance was calculated as if the Company had been applying the OCI option since inception of the contracts.
- For VFA contracts, the cumulative OCI at transition was set equal to the difference between the market value and carrying value of the underlying items.

Reclassification of Financial Assets for the Comparative Period of IFRS 17 Adoption

Under the amendments to IFRS 17 with regard to the "Initial Application of IFRS 17 and IFRS 9 – Comparative Information" ("IFRS 17 amendments"), the Company has elected the option to reclassify financial assets, including those held in respect of activities not connected to contracts within the scope of IFRS 17, on an instrument-by-instrument basis, for the comparative period in alignment with the expected classification on initial application of IFRS 9 as at January 1, 2023. These reclassification changes also led the Company to present certain investment results previously reported in net investment income or OCI under IAS 39, within OCI or net investment income in alignment with the expected classifications of IFRS 9, respectively.

The following table presents invested assets by type and measurement category as at December 31, 2021, with transitional measurement differences and presentation differences and then invested assets by type and category as at January 1, 2022.

	December 31, 2021 IAS 39 Measurement Category	Total carrying value	Impact of IFRS 17 Amendments Measurement Differences	Presentation Differences	January 1, 2022 Total carrying value	Measurement Category
Cash and short-term securities	AFS	$ 13,894	$ -	$ 2,214	$ 16,108	FVOCI(1)
	FVTPL	2,214	-	(2,214)	-	FVTPL(2)
	Amortized cost	6,400	-	-	6,400	Amortized cost(3)
		22,508	-	-	22,508	
Debt securities	AFS	33,097	-	184,365	217,462	FVOCI(1)
	FVTPL	189,722	-	(184,365)	5,357	FVTPL(2)
	Amortized cost	1,320	-	-	1,320	Amortized cost(3)
		224,139	-	-	224,139	
Public equities	AFS	2,351	-	(2,351)	-	
	FVTPL	25,716	-	2,351	28,067	FVTPL(2)
		28,067	-	-	28,067	
Mortgages	AFS	-	1,897	29,901	31,798	FVOCI(1)
	FVTPL	-	37	1,166	1,203	FVTPL(2)
	Amortized cost	52,014	-	(31,067)	20,947	Amortized cost(3)
		52,014	1,934	-	53,948	
Private placements	AFS	-	4,407	42,175	46,582	FVOCI(1)
	FVTPL	-	40	667	707	FVTPL(2)
	Amortized cost	42,842	-	(42,842)	-	Amortized cost(3)
		42,842	4,447	-	47,289	
Policy loans	Amortized cost	6,397	-	(6,397)	-	N/A(4)
Loans to Bank clients	Amortized cost	2,506	-	-	2,506	Amortized cost(3)
Other invested assets	AFS	89	(4)	238	323	FVOCI(1)
	FVTPL	21,157	(10)	617	21,764	FVTPL(2)
	Amortized cost	855	-	(855)	-	Amortized cost(3)
		22,101	(14)	-	22,087	
Total in-scope invested assets		400,574	6,367	(6,397)	400,544	
Out-of-scope invested assets(5)	Other	26,436	1,035	-	27,471	Other(5)
Total Invested Assets		$ 427,010	$ 7,402	$ (6,397)	$ 428,015	

(1) The reclassification of unrealized gains (losses), net of tax, of $11,868 from retained earnings to accumulated other comprehensive income (AOCI) related to FVOCI classification of debt investments classified as FVTPL under IAS 39.

(2) The reclassification of unrealized gains (losses), net of tax, of $268 from AOCI to retained earnings related to FVTPL classification of debt securities classified as FVOCI under IAS 39.

(3) The remeasurement of debt securities from amortized cost to FVOCI or FVTPL resulted in an increase in carrying value of $6,367. The impact on AOCI and retained earnings, net of tax, was $5,041 and $952, respectively.

(4) Policy loans were reclassified from invested assets to insurance contract liabilities under IFRS 17 with no remeasurement and no impact to equity.

(5) Own use real estate properties which are underlying items for insurance contracts with direct participating features were remeasured to fair value as if they were investment properties, as permitted by IFRS 17. This remeasurement resulted in an increase of carrying value of $1,035. The impact to retained earnings, net of tax, was $915.

The Company has elected to apply the impairment requirements of IAS 39 (incurred losses) for the comparative period as provided for under IFRS 17. Accordingly, for assets that were classified as FVTPL under IAS 39, where no impairment was required, but were reclassified to FVOCI or amortized cost under IFRS 9 for the comparative period, the Company did not measure any impairment for the comparative period since IAS 39 impairment was not calculated.

<u>Opening balance sheet under IFRS 17 "Insurance Contracts" including classification and measurement changes of financial assets</u>

Effects from applying IFRS 17 resulted in a reduction of total equity of $11,997, net of tax, as at January 1, 2022. The opening IFRS 17 balance sheet and related adjustments as at January 1, 2022 are presented below:

	IFRS 4 & IAS 39	OPENING IFRS BALANCE SHEET ADJUSTMENTS			**IFRS 17 & IAS 39**
		Measurement Differences			
	December 31, 2021	Transition CSM	Contract Measurement	Presentation Differences	**January 1, 2022**
Assets					
Total invested assets	**$ 427,010**	**$ -**	**$ 7,402**	**$ (6,397)**	**$ 428,015**
Total other assets	**91,412**	**2,877**	**5,617**	**1,078**	**100,984**
Segregated funds net assets	**399,788**	**-**	**-**	**-**	**399,788**
Total assets	**$ 918,210**	**$ 2,877**	**$ 13,019**	**$ (5,319)**	**$ 928,787**
Liabilities and Equity					
Insurance contract liabilities	**$ 392,275**	**$ 21,466**[(1)]	**$ 10,014**	**$ (18,134)**	**$ 405,621**
Segregated funds insurance net liabilities	**-**	**-**	**-**	**130,836**	**130,836**
Total insurance contract liabilities	**392,275**	**21,466**	**10,014**	**112,702**	**536,457**
Total investment contract liabilities	**3,116**	**-**	**-**	**275,900**	**279,016**
Other liabilities	**53,963**	**(2,823)**	**(784)**	**5,867**	**56,223**
Segregated funds net liabilities	**399,788**	**-**	**-**	**(399,788)**	**-**
Total liabilities	**849,142**	**18,643**	**9,230**	**(5,319)**	**871,696**
Equity					
Shareholder's retained earnings	**16,773**	**(13,607)**	**(229)**	**-**	**2,937**
Shareholder's accumulated other comprehensive income (loss)					
Net insurance finance expenses	**-**	**-**	**(17,117)**	**-**	**(17,117)**
Net reinsurance finance income	**-**	**-**	**984**	**-**	**984**
FVOCI investments	**840**	**-**	**16,916**	**-**	**17,756**
Other equity items	**50,994**	**-**	**-**	**-**	**50,994**
Total shareholder's equity	**68,607**	**(13,607)**	**554**	**-**	**55,554**
Participating policyholders' equity	**(1,233)**	**(1,440)**[(1)]	**2,774**	**-**	**101**
Non-controlling interests	**1,694**	**(719)**[(1)]	**461**	**-**	**1,436**
Total equity	**69,068**	**(15,766)**	**3,789**	**-**	**57,091**
Total liabilities and equity	**$ 918,210**	**$ 2,877**	**$ 13,019**	**$ (5,319)**	**$ 928,787**

(1) The post-tax CSM in the participating policyholders' fund of $1.4 billion is expected to be recognized in shareholder net income over time. In addition, $0.7 billion of post-tax CSM is attributable to non-controlling interests.

The following table shows the nature and amount of the measurement adjustments made to the opening balance sheet:

Measurement Differences	Description
Transition CSM	Contractual Service Margin (CSM) is a new liability that represents future unearned profits on insurance contracts written. For this measurement step, the amount recognized as at the transition date, January 1, 2022, was $21,466. The impact on equity was $15,766, net of tax.
Contract Measurement	Under IFRS 17 other components of insurance contracts, aside from the CSM, are also remeasured. This measurement step includes the following changes: **Risk Adjustment (+2.1 billion to equity) (1):** Changes to the provisions held within the Company's insurance liabilities for non-economic risk on application of the IFRS 17 standard; **Discount Rates (-1.5 billion to equity) (1):** Changes in the economic assumptions used in the determination of the Company's insurance liabilities from the IFRS 4 CALM framework to IFRS 17, and changes in the carrying value of the Company's assets backing insurance liabilities under IFRS 9; **Other Revaluation Changes (+3.1 billion to equity):** Includes other changes in equity created by the application of IFRS 17. This includes changes to accounting for contract classifications, variable annuity guarantee contracts, and contract boundaries which increases the capitalization of future profits into the CSM, changes to the provisions for future taxes, and other changes related to the application of IFRS 17.
Participating and Non-Controlling Interest (NCI) Equity	In previous steps all impacts to equity were shown in shareholder's equity. This step shows the geography of the impacts between shareholder's equity, participating policyholders' equity and non-controlling interests.

(i) Excluding impacts on variable annuity guarantee contracts

The presentation differences are mainly comprised of the following:

- **Policy loans invested assets** – Reclassified to insurance contract liabilities as they are insurance contract related.
- **Contract classification** – Some contracts were reclassified from insurance contracts to investment contracts or service contracts, with some contracts reclassified from investment contracts to insurance contracts. The amount shown in presentation differences in the table above relates to where they appear in the opening balance sheet. Any changes to these contracts' measurement value are shown in the contract measurement step.
- **Insurance receivables & payables** – These amounts were previously reported either as separate line items in the financial statements or recorded in miscellaneous assets and liabilities. These amounts have been reclassified to insurance contract liabilities as they are insurance contract related.
- **Embedded derivatives** – These amounts were previously reported in miscellaneous assets and have been reclassified to insurance contract liabilities as they are insurance contract related.
- **Reinsurance funds withheld** - These amounts were previously reported in other liabilities and have been reclassified to reinsurance contract assets as they are reinsurance contract related.
- **Deferred acquisition cost** – These were previously reported in miscellaneous assets and have been reclassified to insurance contract liabilities as they are insurance contract related.
- **Segregated fund net liabilities** – Segregated fund net liabilities were previously reported together, and have been separated into segregated fund insurance net liabilities (those associated with insurance contracts) and segregated funds investment contract net liabilities (those associated with investment contracts) which form part of total investment contract liabilities.

(ii) 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. In conjunction with the amendments to IFRS 17 "Insurance Contracts" issued in June 2020, the IASB amended IFRS 4 "Insurance Contracts" to permit eligible insurers to apply IFRS 9 effective January 1, 2023, alongside IFRS 17. The standard replaced IAS 39 "Financial Instruments: Recognition and Measurement".

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. When IFRS 9 is first adopted, entities have the option to apply the hedge accounting requirements under IFRS 9 or to continue to apply the hedge accounting requirements under IAS 39. Such option will apply to all hedge accounting relationships.

Revisions issued in July 2014 replaced 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 addressed the income statement accounting mismatches and short-term volatility issues which have been identified as a result of the insurance contracts project.

The Company has adopted IFRS 9 beginning on January 1, 2023, as permitted under the June 2020 amendments to IFRS 4 "Insurance Contracts". Consistent with IFRS 17 amendments, the adoption of IFRS 9 resulted in certain differences in the classification and measurement of financial assets when compared to their classification and measurement under IAS 39. The most significant changes included approximately $184 billion of debt securities previously classified as FVTPL which are classified as FVOCI (see note 2(b)(i)).

The Company has elected to apply the hedge accounting requirements under IFRS 9 to all hedge accounting relationships prospectively. As at January 1, 2023, all existing IAS 39 hedge accounting relationships were assessed and qualify for hedge accounting under IFRS 9. These existing relationships are treated as continuing hedge accounting relationships under IFRS 9 beginning on January 1, 2023; and will be disclosed with comparative information for 2022 under IAS 39.

The Company will also be designating new hedge accounting relationships with the objective to reduce accounting mismatches between existing derivatives' changes in income and financial risk changes in OCI for IFRS 17 insurance liabilities and IFRS 9 financial assets. New hedge accounting relationships are effective prospectively on January 1, 2023; and will not have comparative disclosure in the financial statements for 2022.

Note 3 Acquisitions

(a) Manulife TEDA Fund Management

In November, 2022 the Company acquired control of Manulife TEDA Fund Management Co., LTD through the purchase of the remaining 51% of shares that it did not already own from its joint venture partner. The transaction furthers the Company's goals of expanding both its Asian and asset management businesses.

The transaction included $334 of cash consideration and derecognition of the Company's previous joint venture interest with a fair value of $321. The Company recorded a gain of $95 on derecognition of the previous joint venture interest. The Company recognized $160 of tangible net assets, $240 of intangible assets and $255 of goodwill.

Note 4 Invested Assets and Investment Income

(a) Carrying values and fair values of invested assets

As at December 31, 2022	FVTPL(1)	AFS(2)	Other(3)	Total carrying value(4)	Total fair value(5)
Cash and short-term securities(6)	**$ 1,933**	**$ 10,784**	**$ 6,364**	**$ 19,081**	**$ 19,081**
Debt securities(3),(7),(8)					
Canadian government and agency	**14,798**	**6,468**	**-**	**21,266**	**21,266**
U.S. government and agency	**9,440**	**14,384**	**912**	**24,736**	**24,494**
Other government and agency	**22,986**	**3,487**	**-**	**26,473**	**26,473**
Corporate	**120,897**	**7,745**	**499**	**129,141**	**128,972**
Mortgage/asset-backed securities	**2,152**	**136**	**-**	**2,288**	**2,288**
Public equities(9)	**21,989**	**1,530**	**-**	**23,519**	**23,519**
Mortgages	**-**	**-**	**54,638**	**54,638**	**51,429**
Private placements(8)	**-**	**-**	**47,057**	**47,057**	**41,968**
Policy loans	**-**	**-**	**6,894**	**6,894**	**6,894**
Loans to Bank clients	**-**	**-**	**2,781**	**2,781**	**2,760**
Real estate					
Own use property(10)	**-**	**-**	**1,878**	**1,878**	**3,033**
Investment property	**-**	**-**	**11,394**	**11,394**	**11,394**
Other invested assets					
Alternative long-duration assets(11)	**26,348**	**79**	**12,012**	**38,439**	**39,225**
Various other (12)	**131**	**-**	**4,211**	**4,342**	**4,342**
Total invested assets	**$ 220,674**	**$ 44,613**	**$ 148,640**	**$ 413,927**	**$ 407,138**

As at December 31, 2021	FVTPL(1)	AFS(2)	Other(3)	Total carrying value(4)	Total fair value(5)
Cash and short-term securities(6)	$ 2,214	$ 13,894	$ 6,400	$ 22,508	$ 22,508
Debt securities(7),(8)					
Canadian government and agency	18,706	3,964	-	22,670	22,670
U.S. government and agency	12,607	18,792	852	32,251	32,254
Other government and agency	21,888	2,871	-	24,759	24,759
Corporate	133,763	7,332	468	141,563	141,560
Mortgage/asset-backed securities	2,758	138	-	2,896	2,896
Public equities(9)	25,716	2,351	-	28,067	28,067
Mortgages	-	-	52,014	52,014	54,089
Private placements(8)	-	-	42,842	42,842	47,276
Policy loans	-	-	6,397	6,397	6,397
Loans to Bank clients	-	-	2,506	2,506	2,503
Real estate					
Own use property(10)	-	-	1,812	1,812	3,024
Investment property	-	-	11,421	11,421	11,421
Other invested assets					
Alternative long-duration assets(11)	21,022	89	10,093	31,204	31,863
Various other (12)	135	-	3,965	4,100	4,100
Total invested assets	$ 238,809	$ 49,431	$ 138,770	$ 427,010	$ 435,387

(1) FVTPL classification was elected for securities backing insurance contract liabilities to substantially reduce any accounting mismatch arising from changes in the fair value of these assets and changes in the value of the related insurance contract liabilities. If this election had not been made and instead the available-for-sale ("AFS") classification was selected, there would be an accounting mismatch because changes in insurance contract liabilities are recognized in net income rather than in OCI.

(2) Securities that are designated as AFS are not actively traded by the Company but sales do occur as circumstances warrant. Such sales result in a reclassification of any accumulated unrealized gain (loss) in AOCI to net income as a realized gain (loss).

(3) Primarily includes assets classified as loans and carried at amortized cost, own use properties, investment properties, equity method accounted investments, and leveraged leases. Also includes debt securities classified as held-to-maturity which are accounted for at amortized cost. Refer to note 1(e).

(4) Invested assets above include debt securities, mortgages, private placements and approximately $302 (2021 – $323) of other invested assets, which primarily have contractual cash flows that qualify as Solely Payment of Principal and Interest ("SPPI"). Invested assets which do not have SPPI qualifying cash flows as at December 31, 2022 include debt securities, private placements and other invested assets with fair values of $nil, $98 and $507, respectively (2021 – $nil, $181 and $518, respectively). The change in the fair value of these invested assets during the year was $(94) (2021 – $15).

(5) The methodologies used in determining fair values of invested assets are described in note 1(c) and note 4(g).

(6) Includes short-term securities with maturities of less than one year at acquisition amounting to $4,114 (2021 – $7,019), cash equivalents with maturities of less than 90 days at acquisition amounting to $8,603 (2021 – $9,090) and cash of $6,364 (2021 – $6,399).
(7) Debt securities include securities which were acquired with maturities of less than one year and less than 90 days of $1,787 and $870, respectively (2021 – $2,196 and $347, respectively).
(8) Floating rate invested assets above which are subject to interest rate benchmark reform, but have not yet transitioned to replacement reference rates, include debt securities benchmarked to CDOR, USD LIBOR and AUD BBSW of $173, $892 and $15 (2021 – $176, $1,002 and $nil respectively), and private placements benchmarked to USD LIBOR, AUD BBSW and NZD BKBM of $1,613, $199 and $43 (2021 – $1,984, $166 and $43, respectively). Exposures indexed to USD LIBOR represent floating rate invested assets with maturity dates beyond June 30, 2023 while exposures to CDOR represent floating rate invested assets with maturity dates beyond June 28, 2024. The interest rate benchmark reform is expected to have an impact on the valuation of invested assets whose value is tied to the affected interest rate benchmarks. The Company has assessed its exposure at the contract level, by benchmark and instrument type. The Company is monitoring market developments with respect to alternative reference rates and the time horizon during which they will evolve. As at December 31, 2022, the interest rate benchmark reform has not resulted in significant changes in the Company's risk management strategy.
(9) Includes $1 (2021– $5) of public equities that are managed in conjunction with the Company's ALDA strategy.
(10) Includes accumulated depreciation of $411 (2021 – $407).
(11) ALDA include investments in private equity of $14,279, infrastructure of $12,761, oil and gas of $2,221, timber and agriculture of $5,979 and various other invested assets of $3,199 (2021 – $11,598, $9,824, $1,950, $5,259 and $2,573, respectively).
(12) Includes $3,840 (2021 – $3,457) of leveraged leases. Refer to note 1(e).

(b) Equity method accounted invested assets

Other invested assets include investments in associates and joint ventures which are accounted for using the equity method of accounting as presented in the following table.

	2022		2021	
As at December 31,	Carrying value	% of total	Carrying value	% of total
Leveraged leases	**$ 3,840**	**37**	$ 3,457	40
Timber and agriculture	**822**	**8**	808	9
Real estate	**1,845**	**18**	1,528	17
Other	**3,782**	**37**	3,023	34
Total	**$ 10,289**	**100**	$ 8,816	100

The Company's share of profit and dividends from these investments for the year ended December 31, 2022 were $851 and $nil, respectively (2021 – $1,300 and $2).

(c) Investment income

For the year ended December 31, 2022	FVTPL	AFS	Other[1]	Total
Cash and short-term securities				
Interest income	$ 40	$ 337	$ -	$ 377
Gains (losses)[2]	24	85	-	109
Debt securities				
Interest income	6,221	738	66	7,025
Gains (losses)[2]	(32,732)	(549)	-	(33,281)
Recovery (impairment loss), net	(11)	-	-	(11)
Public equities				
Dividend income	500	45	-	545
Gains (losses)[2]	(3,819)	201	-	(3,618)
Impairment loss, net	-	(14)	-	(14)
Mortgages				
Interest income	-	-	1,913	1,913
Gains (losses)[2]	-	-	57	57
Provision, net	-	-	1	1
Private placements				
Interest income	-	-	2,021	2,021
Gains (losses)[2]	-	-	335	335
Impairment loss, net	-	-	(4)	(4)
Policy loans	-	-	385	385
Loans to Bank clients				
Interest income	-	-	138	138
Provision, net	-	-	(4)	(4)
Real estate				
Rental income, net of depreciation[3]	-	-	452	452
Gains (losses)[2]	-	-	(478)	(478)
Impairment loss, net	-	-	-	-
Derivatives				
Interest income, net	494	-	(23)	471
Gains (losses)[2]	(10,640)	-	(44)	(10,684)
Other invested assets				
Interest income	-	-	26	26
Oil and gas, timber, agriculture and other income	-	-	2,846	2,846
Gains (losses)[2]	1,172	13	474	1,659
Impairment loss, net	-	(119)	-	(119)
Total investment income	$ (38,751)	$ 737	$ 8,161	$ (29,853)
Investment income				
Interest income	$ 6,755	$ 1,075	$ 4,526	$ 12,356
Dividend, rental and other income	500	45	3,298	3,843
Impairments, provisions and recoveries, net	(11)	(133)	(7)	(151)
Other	(843)	(216)	235	(824)
	6,401	771	8,052	15,224
Realized and unrealized gains (losses) on assets supporting insurance and investment contract liabilities and on the macro hedge program				
Debt securities	(32,599)	(76)	-	(32,675)
Public equities	(3,626)	24	-	(3,602)
Mortgages	-	-	58	58
Private placements	-	-	336	336
Real estate	-	-	(471)	(471)
Other invested assets	1,572	18	230	1,820
Derivatives, including macro hedge program	(10,499)	-	(44)	(10,543)
	(45,152)	(34)	109	(45,077)
Total investment income	$ (38,751)	$ 737	$ 8,161	$ (29,853)

For the year ended December 31, 2021		FVTPL		AFS		Other[(1)]		Total
Cash and short-term securities								
Interest income	$	12	$	96	$	-	$	108
Gains (losses)[(2)]		81		(19)		-		62
Debt securities								
Interest income		5,643		576		9		6,228
Gains (losses)[(2)]		(5,674)		(266)		-		(5,940)
Impairment loss, net		28		1		-		29
Public equities								
Dividend income		670		61		-		731
Gains (losses)[(2)]		3,221		250		-		3,471
Impairment loss, net		-		(3)		-		(3)
Mortgages								
Interest income		-		-		1,709		1,709
Gains (losses)[(2)]		-		-		133		133
Provision, net		-		-		1		1
Private placements								
Interest income		-		-		1,931		1,931
Gains (losses)[(2)]		-		-		270		270
Impairment loss, net		-		-		45		45
Policy loans		-		-		366		366
Loans to Bank clients								
Interest income		-		-		77		77
Provision, net		-		-		(2)		(2)
Real estate								
Rental income, net of depreciation[(3)]		-		-		453		453
Gains (losses)[(2)]		-		-		677		677
Derivatives								
Interest income, net		1,085		-		(33)		1,052
Gains (losses)[(2)]		(5,903)		-		7		(5,896)
Other invested assets								
Interest income		-		-		57		57
Oil and gas, timber, agriculture and other income		-		-		3,011		3,011
Gains (losses)[(2)]		2,554		23		527		3,104
Impairment loss, net		-		-		(55)		(55)
Total investment income	$	1,717	$	719	$	9,183	$	11,619
Investment income								
Interest income	$	6,740	$	672	$	4,116	$	11,528
Dividend, rental and other income		670		61		3,464		4,195
Impairments, provisions and recoveries, net		28		(2)		(11)		15
Other		(111)		(62)		57		(116)
		7,327		669		7,626		15,622
Realized and unrealized gains (losses) on assets supporting insurance and investment contract liabilities and on the macro hedge program								
Debt securities		(5,605)		20		-		(5,585)
Public equities		3,187		33		-		3,220
Mortgages		-		-		133		133
Private placements		-		-		270		270
Real estate		-		-		696		696
Other invested assets		2,628		(3)		451		3,076
Derivatives, including macro hedge program		(5,820)		-		7		(5,813)
		(5,610)		50		1,557		(4,003)
Total investment income	$	1,717	$	719	$	9,183	$	11,619

(1) Primarily includes investment income on loans carried at amortized cost, own use real estate properties, investment properties, derivative and hedging instruments in cash flow hedging relationships, equity method accounted investments, oil and gas investments, and leveraged leases.
(2) Includes net realized and unrealized gains (losses) for financial instruments at FVTPL, investment properties, and other invested assets measured at fair value. Also includes net realized gains (losses) for financial instruments at AFS and other invested assets carried at amortized cost.
(3) Rental income from investment properties is net of direct operating expenses.

(d) Investment expenses

The following table presents total investment expenses.

For the years ended December 31,		2022		2021
Related to invested assets	$	718	$	651
Related to segregated, mutual and other funds		1,145		1,347
Total investment expenses	$	1,863	$	1,998

(e) Investment properties

The following table presents the rental income and direct operating expenses of investment properties.

For the years ended December 31,		2022		2021
Rental income from investment properties	$	825	$	837
Direct operating expenses of rental investment properties		(458)		(464)
Total	$	367	$	373

(f) Mortgage securitization

The Company securitizes certain insured and uninsured fixed and variable rate residential mortgages and Home Equity Lines of Credit ("HELOC") through creation of mortgage-backed securities under the Canadian Mortgage Bond Program ("CMB"), and the HELOC securitization program.

Benefits received from the securitization include interest spread between the asset and associated liability. There is no credit exposure from securitized mortgages under the Canada Mortgage and Housing Corporation ("CMHC") sponsored CMB securitization program as they are insured by CMHC and other third-party insurance programs against borrowers' default. Mortgages securitized in the Platinum Canadian Mortgage Trust II ("PCMT II") program are uninsured.

Cash flows received from the underlying securitized assets/mortgages are used to settle the related secured borrowing liability. For CMB transactions, receipts of principal are deposited into a trust account for settlement of the liability at time of maturity. These transferred assets and related cash flows cannot be transferred or used for other purposes. For the HELOC transactions, investors are entitled to periodic interest payments, and the remaining cash receipts of principal are allocated to the Company (the "Seller") during the revolving period of the deal and are accumulated for settlement during an accumulation period or repaid to the investor monthly during a reduction period, based on the terms of the note.

Securitized assets and secured borrowing liabilities

As at December 31, 2022	Securitized assets							
Securitization program		Securitized mortgages		Restricted cash and short-term securities		Total		Secured borrowing liabilities[2]
HELOC securitization[1]	$	**2,880**	$	**44**	$	**2,924**	$	**2,750**
CMB securitization		**2,318**		**-**		**2,318**		**2,273**
Total	$	**5,198**	$	**44**	$	**5,242**	$	**5,023**

As at December 31, 2021	Securitized assets							
Securitization program		Securitized mortgages		Restricted cash and short-term securities		Total		Secured borrowing liabilities[2]
HELOC securitization[1]	$	2,618	$	1	$	2,619	$	2,500
CMB securitization		2,075		-		2,075		2,098
Total	$	4,693	$	1	$	4,694	$	4,598

(1) Manulife Bank, an MLI subsidiary, securitizes a portion of its HELOC receivables through Platinum Canadian Mortgage Trust II ("PCMT II"). PCMT II funds the purchase of the co-ownership interests from Manulife Bank by issuing term notes collateralized by an underlying pool of uninsured HELOCs to institutional investors. The restricted cash balance for the HELOC securitization reflects a cash reserve fund established in relation to the transactions. The reserve will be drawn upon only in the event of insufficient cash flows from the underlying HELOCs to satisfy the secured borrowing liability.

(2) The PCMT II notes payable have floating rates of interest and are secured by the PCMT II assets. Under the terms of the agreements, no principal is expected to be repaid within one year, $1,209 within 1-3 years, $1,049 within 3-5 years and $492 beyond 5 years. There is no specific maturity date for the contractual agreements. Under the terms of the notes, additional collateral must be provided to the series as added credit protection and the Series Purchase Agreements govern the amount of over-collateralization for each of the term notes outstanding. Manulife Bank also securitizes insured amortizing mortgages under the National Housing Act Mortgage-Backed Securities ("NHA MBS") program sponsored by CMHC. Manulife Bank participates in CMB programs by selling NHA MBS securities to Canada Housing Trust ("CHT"), as a source of fixed rate funding.

As at December 31, 2022, the fair value of securitized assets and associated liabilities were $5,167 and $4,865, respectively (2021 – $4,725 and $4,601).

(g) Fair value measurement

The following table presents the fair values of invested assets and segregated funds net assets measured at fair value categorized by the fair value hierarchy.

As at December 31, 2022	Total fair value	Level 1	Level 2	Level 3
Cash and short-term securities				
FVTPL	**$ 1,933**	**$ -**	**$ 1,933**	**$ -**
AFS	**10,784**	**-**	**10,784**	**-**
Other	**6,364**	**6,364**	**-**	**-**
Debt securities				
FVTPL				
Canadian government and agency	**14,798**	**-**	**14,798**	**-**
U.S. government and agency	**9,440**	**-**	**9,440**	**-**
Other government and agency	**22,986**	**-**	**22,986**	**-**
Corporate	**120,897**	**-**	**120,865**	**32**
Residential mortgage-backed securities	**7**	**-**	**7**	**-**
Commercial mortgage-backed securities	**570**	**-**	**570**	**-**
Other asset-backed securities	**1,575**	**-**	**1,549**	**26**
AFS				
Canadian government and agency	**6,468**	**-**	**6,468**	**-**
U.S. government and agency	**14,384**	**-**	**14,384**	**-**
Other government and agency	**3,487**	**-**	**3,478**	**9**
Corporate	**7,745**	**-**	**7,745**	**-**
Residential mortgage-backed securities	**1**	**-**	**1**	**-**
Commercial mortgage-backed securities	**24**	**-**	**24**	**-**
Other asset-backed securities	**111**	**-**	**111**	**-**
Public equities				
FVTPL	**21,989**	**21,918**	**-**	**71**
AFS	**1,530**	**1,530**	**-**	**-**
Real estate - investment property(1)	**11,394**	**-**	**-**	**11,394**
Other invested assets(2)	**30,256**	**26**	**-**	**30,230**
Segregated funds net assets(3)	**348,562**	**314,436**	**30,141**	**3,985**
Total	**$ 635,305**	**$ 344,274**	**$ 245,284**	**$ 45,747**

As at December 31, 2021	Total fair value	Level 1	Level 2	Level 3
Cash and short-term securities				
FVTPL	$ 2,214	$ -	$ 2,214	$ -
AFS	13,894	-	13,894	-
Other	6,400	6,400	-	-
Debt securities				
FVTPL				
Canadian government and agency	18,706	-	18,706	-
U.S. government and agency	12,607	-	12,607	-
Other government and agency	21,888	-	21,888	-
Corporate	133,763	-	133,723	40
Residential mortgage-backed securities	8	-	8	-
Commercial mortgage-backed securities	1,103	-	1,103	-
Other asset-backed securities	1,647	-	1,619	28
AFS				
Canadian government and agency	3,964	-	3,964	-
U.S. government and agency	18,792	-	18,792	-
Other government and agency	2,871	-	2,871	-
Corporate	7,332	-	7,331	1
Residential mortgage-backed securities	1	-	1	-
Commercial mortgage-backed securities	79	-	79	-
Other asset-backed securities	58	-	58	-
Public equities				
FVTPL	25,716	25,716	-	-
AFS	2,351	2,349	2	-
Real estate - investment property[(1)]	11,421	-	-	11,421
Other invested assets[(2)]	24,300	257	-	24,043
Segregated funds net assets[(3)]	399,788	361,447	34,060	4,281
Total	$ 708,903	$ 396,169	$ 272,920	$ 39,814

(1) For investment properties, the significant unobservable inputs are capitalization rates (ranging from 2.25% to 9.00% during the year and ranging from 2.25% to 9.00% during 2021), terminal capitalization rates (ranging from 3.25% to 9.50% during the year and ranging from 3.25% to 9.25% during 2021) and discount rates (ranging from 3.30% to 11.00% during the year and ranging from 3.80% to 10.50% during 2021). Holding other factors constant, a higher capitalization, terminal capitalization, and/or discount rate will decrease the fair value of an investment property; while decreases in these rates would have the opposite effect. Changes in fair value based on variations in unobservable inputs generally cannot be extrapolated because the relationship between the directional changes of each input is not usually linear.

(2) Other invested assets measured at fair value are held primarily in infrastructure and timber sectors. The significant inputs used in the valuation of the Company's infrastructure investments are primarily future distributable cash flows, terminal values and discount rates. Holding other factors constant, an increase to future distributable cash flows or terminal values would tend to increase the fair value of an infrastructure investment, while an increase in the discount rate would have the opposite effect. Discount rates during the year ranged from 7.15% to 15.6% (2021 – ranged from 7.25% to 20.0%). Disclosure of distributable cash flow and terminal value ranges are not meaningful given the disparity in estimates by project. The significant inputs used in the valuation of the Company's investments in timberland are timber prices and discount rates. Holding other factors constant, an increase to timber prices would tend to increase the fair value of a timberland investment, while an increase in the discount rates would have the opposite effect. Discount rates during the year ranged from 4.25% to 7.0% (2021 – ranged from 4.5% to 7.0%). A range of prices for timber is not meaningful as the market price depends on factors such as property location and proximity to markets and export yards.

(3) Segregated funds net assets are measured at fair value. The Company's Level 3 segregated funds assets are predominantly in investment properties and timberland properties valued as described above.

The following table presents fair value of invested assets not measured at fair value by the fair value hierarchy.

As at December 31, 2022	Carrying value	Total fair value	Level 1	Level 2	Level 3
Mortgages[1]	**$ 54,638**	**$ 51,429**	**$ -**	**$ -**	**$ 51,429**
Private placements[2]	**47,057**	**41,968**	**-**	**34,110**	**7,858**
Policy loans[3]	**6,894**	**6,894**	**-**	**6,894**	**-**
Loans to Bank clients[4]	**2,781**	**2,760**	**-**	**2,760**	**-**
Real estate - own use property[5]	**1,878**	**3,033**	**-**	**-**	**3,033**
Public Bonds HTM	**1,411**	**1,000**	**-**	**1,000**	**-**
Other invested assets[6]	**12,525**	**13,311**	**72**	**-**	**13,239**
Total invested assets disclosed at fair value	**$ 127,184**	**$ 120,395**	**$ 72**	**$ 44,764**	**$ 75,559**

As at December 31, 2021	Carrying value	Total fair value	Level 1	Level 2	Level 3
Mortgages[1]	$ 52,014	$ 54,089	$ -	$ -	$ 54,089
Private placements[2]	42,842	47,276	-	42,110	5,166
Policy loans[3]	6,397	6,397	-	6,397	-
Loans to Bank clients[4]	2,506	2,503	-	2,503	-
Real estate - own use property[5]	1,812	3,024	-	-	3,024
Public Bonds HTM	1,320	1,320	-	1,320	-
Other invested assets[6]	11,004	11,663	121	-	11,542
Total invested assets disclosed at fair value	$ 117,895	$ 126,272	$ 121	$ 52,330	$ 73,821

(1) Fair value of commercial mortgages is determined through an internal valuation methodology using both observable and unobservable inputs. Unobservable inputs include credit assumptions and liquidity spread adjustments. Fair value of fixed-rate residential mortgages is determined using the discounted cash flow method. Inputs used for valuation are primarily comprised of prevailing interest rates and prepayment rates, if applicable. Fair value of variable-rate residential mortgages is assumed to be their carrying value.

(2) Fair value of private placements is determined through an internal valuation methodology using both observable and unobservable inputs. Unobservable inputs include credit assumptions and liquidity spread adjustments. Private placements are classified within Level 2 unless the liquidity adjustment constitutes a significant price impact, in which case the securities are classified as Level 3.

(3) Fair value of policy loans is equal to their unpaid principal balances.

(4) Fair value of fixed-rate loans to Bank clients is determined using the discounted cash flow method. Inputs used for valuation are primarily comprised of current interest rates. Fair value of variable-rate loans is assumed to be their carrying value.

(5) Fair value of own use real estate and the fair value hierarchy are determined in accordance with the methodologies described for investment property in note 1.

(6) Primarily include leveraged leases, oil and gas properties (disposed of during 2021) and equity method accounted other invested assets. Fair value of leveraged leases is disclosed at their carrying values as fair value is not routinely calculated on these investments. Fair value for oil and gas properties is determined using external appraisals based on discounted cash flow methodology. Inputs used in valuation are primarily comprised of forecasted price curves, planned production, as well as capital expenditures, and operating costs. Fair value of equity method accounted other invested assets is determined using a variety of valuation techniques including discounted cash flows and market comparable approaches. Inputs vary based on the specific investment.

Transfers between Level 1 and Level 2

The Company records transfers of assets and liabilities between Level 1 and Level 2 at their fair values as at the end of each reporting period, consistent with the date of the determination of fair value. Assets are transferred out of Level 1 when they are no longer transacted with sufficient frequency and volume in an active market. Conversely, assets are transferred from Level 2 to Level 1 when transaction volume and frequency are indicative of an active market. The Company had $nil of assets transferred between Level 1 and Level 2 during the years ended December 31, 2022 (2021 – $5).

For segregated funds net assets, the Company had $nil transfers from Level 1 to Level 2 for the year ended December 31, 2022 (2021 – $5). The Company had $nil transfers from Level 2 to Level 1 for the year ended December 31, 2022 (2021 – $249).

Invested assets and segregated funds net assets measured at fair value using significant unobservable inputs (Level 3)

The Company classifies fair values of invested assets and segregated funds net assets as Level 3 if there are no observable markets for these assets or, in the absence of active markets, most of the inputs used to determine fair value are based on the Company's own assumptions about market participant assumptions. The Company prioritizes the use of market-based inputs over entity-based assumptions in determining Level 3 fair values. The gains and losses in the table below includes the changes in fair value due to both observable and unobservable factors.

The following table presents a roll forward for invested assets, net derivatives and segregated funds net assets measured at fair value using significant unobservable inputs (Level 3) for the years ended December 31, 2022 and 2021.

For the year ended December 31, 2022	Balance, January 1, 2022	Total gains (losses) included in net income[(1)]	Total gains (losses) included in AOCI[(2)]	Purchases	Sales	Settlements	Transfer in[(3)]	Transfer out[(3)]	Currency movement	**Balance, December 31, 2022**	Change in unrealized gains (losses) on assets still held
Debt securities											
FVTPL											
Corporate	**$ 40**	**$ (1)**	**$ -**	**$ 27**	**$ -**	**$ (1)**	**$ 6**	**$ (40)**	**$ 1**	**$ 32**	**$ (1)**
Other securitized assets	**28**	**2**	**-**	**-**	**-**	**(4)**	**-**	**-**	**-**	**26**	**2**
AFS											
Other government &	**-**	**-**	**-**	**-**	**-**	**-**	**10**	**-**	**(1)**	**9**	**-**
Corporate	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**(1)**	**-**	**-**	**-**
Public equities											
FVTPL	**-**	**(6)**	**-**	**69**	**(84)**	**-**	**87**	**-**	**5**	**71**	**(15)**
AFS	**-**	**(1)**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Investment property	**11,421**	**(443)**	**-**	**312**	**(237)**	**-**	**15**	**-**	**326**	**11,394**	**(446)**
Other invested assets	**24,043**	**1,922**	**7**	**4,934**	**(666)**	**(1,474)**	**248**	**-**	**1,216**	**30,230**	**2,046**
Total invested assets	**35,533**	**1,473**	**8**	**5,342**	**(987)**	**(1,479)**	**366**	**(41)**	**1,547**	**41,762**	**1,586**
Derivatives, net	**2,101**	**(5,429)**	**(7)**	**(109)**	**-**	**775**	**-**	**(356)**	**(163)**	**(3,188)**	**(3,527)**
Segregated funds net assets	**4,281**	**475**	**-**	**246**	**(1,113)**	**(46)**	**-**	**(1)**	**143**	**3,985**	**79**
Total	**$ 41,915**	**$ (3,481)**	**$ 1**	**$ 5,479**	**$ (2,100)**	**$ (750)**	**$ 366**	**$ (398)**	**$ 1,527**	**$ 42,559**	**$ (1,862)**

For the year ended December 31, 2021	Balance, January 1, 2021	Total gains (losses) included in net income[(1)]	Total gains (losses) included in AOCI[(2)]	Purchases	Sales	Settlements	Transfer in[(3)]	Transfer out[(3)]	Currency movement	**Balance, December 31, 2021**	Change in unrealized gains (losses) on assets still held
Debt securities											
FVTPL											
Corporate	$ 510	$ 11	$ -	$ 11	$ (93)	$ -	$ 11	$ (409)	$ (1)	$ 40	$ (8)
Other securitized assets	45	3	-	-	(9)	(39)	28	-	-	28	(4)
AFS											
Corporate	3	1	-	-	(3)	-	-	-	-	1	-
Public equities											
FVTPL	-	-	-	62	(62)	-	-	-	-	-	-
Investment property	10,982	702	-	186	(376)	-	-	-	(73)	11,421	626
Other invested assets	19,049	2,731	2	5,058	(1,131)	(1,453)	5	-	(218)	24,043	2,569
Total invested assets	30,589	3,448	2	5,317	(1,674)	(1,492)	44	(409)	(292)	35,533	3,183
Derivatives, net	3,443	(897)	-	14	-	(182)	-	(309)	32	2,101	(547)
Segregated funds net assets	4,202	350	-	68	(303)	(28)	-	-	(8)	4,281	116
Total	$ 38,234	$ 2,901	$ 2	$ 5,399	$ (1,977)	$ (1,702)	$ 44	$ (718)	$ (268)	$ 41,915	$ 2,752

(1) These amounts are included in net investment income on the Consolidated Statements of Income except for the amount related to segregated funds net assets, where the amount is recorded in changes in segregated funds net assets, refer to notes 1(h) and 22.
(2) These amounts are included in AOCI on the Consolidated Statements of Financial Position.
(3) The Company uses fair values of the assets at the beginning of the year for assets transferred into and out of Level 3 except for derivatives, where the Company uses fair value at the end of the year and at the beginning of the year, respectively.

Transfers into Level 3 primarily result from securities that were impaired during the year or securities where a lack of observable market data (versus the previous period) resulted in reclassifying assets into Level 3. Transfers from Level 3 primarily result from observable market data becoming available for the entire term structure of the debt security.

Note 5 Derivative and Hedging Instruments

Derivatives are financial contracts, the value of which is derived from underlying interest rates, foreign exchange rates, other financial instruments, commodity prices or indices. The Company uses derivatives including swaps, forward and futures agreements, and options to manage current and anticipated exposures to changes in interest rates, foreign exchange rates, commodity prices and equity market prices, and to replicate permissible investments.

Swaps are over-the-counter ("OTC") contractual agreements between the Company and a third party to exchange a series of cash flows based upon rates applied to a notional amount. For interest rate swaps, counterparties generally exchange fixed or floating interest rate payments based on a notional value in a single currency. Cross currency swaps involve the exchange of principal amounts between parties as well as the exchange of interest payments in one currency for the receipt of interest payments in another currency. Total return swaps are contracts that involve the exchange of payments based on changes in the values of a reference asset, including any returns such as interest earned on these assets, in return for amounts based on reference rates specified in the contract.

Forward and futures agreements are contractual obligations to buy or sell a financial instrument, foreign currency or other underlying commodity on a predetermined future date at a specified price. Forward contracts are OTC contracts negotiated between counterparties, whereas futures agreements are contracts with standard amounts and settlement dates that are traded on regulated exchanges.

Options are contractual agreements whereby the holder has the right, but not the obligation, to buy (call option) or sell (put option) a security, exchange rate, interest rate, or other financial instrument at a predetermined price/rate within a specified time.

See variable annuity dynamic hedging strategy in note 9(a) for an explanation of the Company's dynamic hedging strategy for its variable annuity product guarantees.

(a) Fair value of derivatives

The pricing models used to value OTC derivatives are based on market standard valuation methodologies and the inputs to these models are consistent with what a market participant would use when pricing the instruments. Derivative valuations can be affected by changes in interest rates, currency exchange rates, financial indices, credit spreads, default risk (including the counterparties to the contract), and market volatility. The significant inputs to the pricing models for most OTC derivatives are inputs that are observable or can be corroborated by observable market data and are classified as Level 2. Inputs that are observable generally include interest rates, foreign currency exchange rates and interest rate curves. However, certain OTC derivatives may rely on inputs that are significant to the fair value that are not observable in the market or cannot be derived principally from, or corroborated by, observable market data and these derivatives are classified as Level 3. Inputs that are unobservable generally include broker quoted prices, volatilities and inputs that are outside of the observable portion of the interest rate curve or other relevant market measures. These unobservable inputs may involve significant management judgment or estimation. Even though unobservable, these inputs are based on assumptions deemed appropriate given the circumstances and consistent with what market participants would use when pricing such instruments. The credit risk of both the counterparty and the Company are considered in determining the fair value for all OTC derivatives after considering the effects of netting agreements and collateral arrangements.

The following table presents gross notional amount and fair value of derivative instruments by the underlying risk exposure.

As at December 31,		2022			2021		
		Notional	Fair value		Notional	Fair value	
Type of hedge	Instrument type	amount	Assets	Liabilities	amount	Assets	Liabilities
Derivatives in qualifying hedge accounting relationships							
Fair value hedges	Foreign currency swaps	**$ 48**	**$ 5**	**$ -**	$ 57	$ 1	$ 1
Cash flow hedges	Foreign currency swaps	**650**	**-**	**203**	781	-	379
	Forward contracts	**-**	**-**	**-**	-	-	-
	Equity contracts	**173**	**3**	**-**	145	10	-
Net investment hedges	Foreign currency swaps	**3,682**	**51**	**38**	3,683	147	29
	Forward contracts	**626**	**-**	**28**	671	9	-
Total derivatives in qualifying hedge accounting relationships		**5,179**	**59**	**269**	5,337	167	409
Derivatives not designated in qualifying hedge accounting relationships							
	Interest rate swaps	**268,081**	**5,751**	**7,557**	300,556	11,832	7,347
	Interest rate futures	**11,772**	**-**	**-**	11,944	-	-
	Interest rate options	**6,090**	**98**	**-**	10,708	514	-
	Foreign currency swaps	**40,640**	**2,068**	**1,618**	37,342	795	1,728
	Currency rate futures	**2,319**	**-**	**-**	3,086	-	-
	Forward contracts	**45,124**	**295**	**4,697**	45,295	2,674	562
	Equity contracts	**16,930**	**363**	**225**	18,577	1,667	27
	Credit default swaps	**159**	**4**	**-**	44	1	-
	Equity futures	**3,813**	**-**	**-**	11,359	-	-
Total derivatives not designated in qualifying hedge accounting relationships		**394,928**	**8,579**	**14,097**	438,911	17,483	9,664
Total derivatives		**$ 400,107**	**$ 8,638**	**$ 14,366**	$ 444,248	$ 17,650	$ 10,073

The total notional amount above includes $211 billion (2021 – $258 billion) of derivative instruments which reference rates that are impacted under the interest rate benchmark reform, with a significant majority to USD LIBOR, and CDOR. Exposures indexed to USD LIBOR and CDOR represent derivatives with maturity dates beyond June 30, 2023 and June 28, 2024, respectively. The exposure in the Company's hedge accounting programs is primarily to USD LIBOR and CDOR benchmarks. Compared to the overall risk exposure, the effect of interest rate benchmark reform on existing accounting hedges is not significant. The Company continues to apply high probability and high effectiveness expectation assumptions for cash flows and there would be no automatic de-designation of qualifying hedge relationships due to the impact from interest rate benchmark reform.

The following table presents the fair values of the derivative instruments by the remaining term to maturity. Fair values disclosed below do not incorporate the impact of master netting agreements (refer to note 9).

	Remaining term to maturity				
As at December 31, 2022	Less than 1 year	1 to 3 years	3 to 5 years	Over 5 years	Total
Derivative assets	**$ 580**	**$ 556**	**$ 606**	**$ 6,896**	**$ 8,638**
Derivative liabilities	**2,656**	**1,996**	**1,163**	**8,551**	**14,366**

	Remaining term to maturity				
As at December 31, 2021	Less than 1 year	1 to 3 years	3 to 5 years	Over 5 years	Total
Derivative assets	$ 2,500	$ 1,803	$ 1,054	$ 12,293	$ 17,650
Derivative liabilities	294	393	379	9,007	10,073

The following table presents gross notional amount by the remaining term to maturity, total fair value (including accrued interest), credit equivalent amount and capital requirement by contract type.

	Remaining term to maturity (notional amounts)				Fair value				
As at December 31, 2022	Under 1 year	1 to 5 years	Over 5 years	Total	Positive	Negative	Net	Credit equivalent amount[1]	Capital requirement[2]
Interest rate contracts									
OTC swap contracts	**$ 8,817**	**$ 19,253**	**$ 98,380**	**$ 126,450**	**$ 5,992**	**$ (8,135)**	**$ (2,143)**	**$ 419**	**$ 9**
Cleared swap contracts	**2,494**	**16,823**	**122,314**	**141,631**	**254**	**(219)**	**35**	**-**	**-**
Forward contracts	**14,290**	**13,926**	**198**	**28,414**	**70**	**(4,468)**	**(4,398)**	**8**	**-**
Futures	**11,772**	**-**	**-**	**11,772**	**-**	**-**	**-**	**-**	**-**
Options purchased	**1,199**	**1,069**	**3,822**	**6,090**	**98**	**-**	**98**	**64**	**4**
Subtotal	**38,572**	**51,071**	**224,714**	**314,357**	**6,414**	**(12,822)**	**(6,408)**	**491**	**13**
Foreign exchange									
Swap contracts	**2,026**	**13,620**	**29,374**	**45,020**	**2,118**	**(1,925)**	**193**	**1,259**	**25**
Forward contracts	**17,336**	**-**	**-**	**17,336**	**226**	**(258)**	**(32)**	**89**	**-**
Futures	**2,319**	**-**	**-**	**2,319**	**-**	**-**	**-**	**-**	**-**
Credit derivatives	**15**	**144**	**-**	**159**	**4**	**-**	**4**	**-**	**-**
Equity contracts									
Swap contracts	**547**	**396**	**-**	**943**	**26**	**(7)**	**19**	**24**	**-**
Futures	**3,813**	**-**	**-**	**3,813**	**-**	**-**	**-**	**-**	**-**
Options purchased	**12,634**	**3,526**	**-**	**16,160**	**335**	**(218)**	**117**	**232**	**2**
Subtotal including accrued interest	**77,262**	**68,757**	**254,088**	**400,107**	**9,123**	**(15,230)**	**(6,107)**	**2,095**	**40**
Less accrued interest	**-**	**-**	**-**	**-**	**485**	**(864)**	**(379)**	**-**	**-**
Total	**$ 77,262**	**$ 68,757**	**$ 254,088**	**$ 400,107**	**$ 8,638**	**$ (14,366)**	**$ (5,728)**	**$ 2,095**	**$ 40**

	Remaining term to maturity (notional amounts)				Fair value				
As at December 31, 2021	Under 1 year	1 to 5 years	Over 5 years	Total	Positive	Negative	Net	Credit equivalent amount[1]	Capital requirement[2]
Interest rate contracts									
OTC swap contracts	$ 4,554	$ 21,884	$ 90,592	$ 117,030	$ 12,112	$ (7,717)	$ 4,395	$ 1,584	$ 29
Cleared swap contracts	21,722	27,665	134,139	183,526	441	(453)	(12)	-	-
Forward contracts	14,636	15,791	741	31,168	2,625	(483)	2,142	299	5
Futures	11,944	-	-	11,944	-	-	-	-	-
Options purchased	1,406	2,789	6,513	10,708	515	-	515	113	9
Subtotal	54,262	68,129	231,985	354,376	15,693	(8,653)	7,040	1,996	43
Foreign exchange									
Swap contracts	1,941	11,037	28,885	41,863	948	(2,215)	(1,267)	1,602	32
Forward contracts	14,798	-	-	14,798	58	(79)	(21)	85	-
Futures	3,086	-	-	3,086	-	-	-	-	-
Credit derivatives	11	33	-	44	1	-	1	-	-
Equity contracts									
Swap contracts	669	323	-	992	57	(10)	47	29	-
Futures	11,359	-	-	11,359	-	-	-	-	-
Options purchased	10,974	6,716	40	17,730	1,616	(17)	1,599	768	8
Subtotal including accrued interest	97,100	86,238	260,910	444,248	18,373	(10,974)	7,399	4,480	83
Less accrued interest	-	-	-	-	723	(901)	(178)	-	-
Total	$ 97,100	$ 86,238	$ 260,910	$ 444,248	$ 17,650	$ (10,073)	$ 7,577	$ 4,480	$ 83

(1) Credit equivalent amount is the sum of replacement cost and the potential future credit exposure less any collateral held. Replacement cost represents the current cost of replacing all contracts with a positive fair value. The amounts take into consideration legal contracts that permit offsetting of positions. The potential future credit exposure is calculated based on a formula prescribed by OSFI.

(2) Capital requirement represents the credit equivalent amount, weighted according to the creditworthiness of the counterparty, as prescribed by OSFI.

The total notional amount of $400 billion (2021 – $444 billion) includes $77 billion (2021 – $121 billion) related to derivatives utilized in the Company's variable annuity guarantee dynamic hedging and macro risk hedging programs. During 2022, the Company discontinued the dynamic hedging program for the John Hancock Life Insurance Company (U.S.A.) ("JHUSA") legacy variable annuities, reinsured with Venerable Holdings, Inc. as disclosed in note 7(k). Due to the Company's variable annuity hedging practices, many trades are in offsetting positions, resulting in materially lower net fair value exposure to the Company than what the gross notional amount would suggest.

Fair value and the fair value hierarchy of derivative instruments

As at December 31, 2022	Fair value	Level 1	Level 2	Level 3
Derivative assets				
Interest rate contracts	**$ 5,919**	**$ -**	**$ 5,766**	**$ 153**
Foreign exchange contracts	**2,349**	**-**	**2,348**	**1**
Equity contracts	**366**	**-**	**361**	**5**
Credit default swaps	**4**	**-**	**4**	**-**
Total derivative assets	**$ 8,638**	**$ -**	**$ 8,479**	**$ 159**
Derivative liabilities				
Interest rate contracts	**$ 12,025**	**$ -**	**$ 8,689**	**$ 3,336**
Foreign exchange contracts	**2,116**	**-**	**2,114**	**2**
Equity contracts	**225**	**-**	**216**	**9**
Total derivative liabilities	**$ 14,366**	**$ -**	**$ 11,019**	**$ 3,347**

As at December 31, 2021	Fair value	Level 1	Level 2	Level 3
Derivative assets				
Interest rate contracts	$ 14,971	$ -	$ 12,510	$ 2,461
Foreign exchange contracts	1,001	-	1,001	-
Equity contracts	1,677	-	1,616	61
Credit default swaps	1	-	1	-
Total derivative assets	$ 17,650	$ -	$ 15,128	$ 2,522
Derivative liabilities				
Interest rate contracts	$ 7,829	$ -	$ 7,419	$ 410
Foreign exchange contracts	2,217	-	2,216	1
Equity contracts	27	-	17	10
Total derivative liabilities	$ 10,073	$ -	$ 9,652	$ 421

Level 3 roll forward information for net derivative contracts measured using significant unobservable inputs is disclosed in note 4(g).

(b) Hedging relationships

The Company uses derivatives for economic hedging purposes. In certain circumstances, these hedges also meet the requirements of hedge accounting. Risk management strategies eligible for hedge accounting are designated as fair value hedges, cash flow hedges or net investment hedges, as described below.

Fair value hedges

The Company uses interest rate swaps to manage its exposure to changes in the fair value of fixed rate financial instruments due to changes in interest rates. The Company also uses cross currency swaps to manage its exposure to foreign exchange rate fluctuations, interest rate fluctuations, or both.

The Company recognizes gains and losses on derivatives and the related hedged items in fair value hedges in investment income. These investment gains (losses) are shown in the following table.

For the year ended December 31, 2022	Hedged items in qualifying fair value hedging relationships	Gains (losses) recognized on derivatives	Gains (losses) recognized for hedged items	Ineffectiveness recognized in investment income
Foreign currency swaps	Fixed rate assets	**$ 7**	**$ (5)**	**$ 2**
Total		**$ 7**	**$ (5)**	**$ 2**

For the year ended December 31, 2021	Hedged items in qualifying fair value hedging relationships	Gains (losses) recognized on derivatives	Gains (losses) recognized for hedged items	Ineffectiveness recognized in investment income
Foreign currency swaps	Fixed rate assets	$ 4	$ (2)	$ 2
Total		$ 4	$ (2)	$ 2

Cash flow hedges

The Company uses interest rate swaps to hedge the variability in cash flows from variable rate financial instruments and forecasted transactions. The Company also uses cross currency swaps and foreign currency forward contracts to hedge the variability from foreign currency financial instruments and foreign currency expenses. Total return swaps are used to hedge the variability in cash flows associated with certain stock-based compensation awards. Inflation swaps are used to reduce inflation risk generated from inflation-indexed liabilities.

The effects of derivatives in cash flow hedging relationships on the Consolidated Statements of Income and the Consolidated Statements of Comprehensive Income are shown in the following table.

For the year ended December 31, 2022	Hedged items in qualifying cash flow hedging relationships	Gains (losses) deferred in AOCI on derivatives	Gains (losses) reclassified from AOCI into investment income	Ineffectiveness recognized in investment income
Foreign currency swaps	Fixed rate assets	**$ (1)**	**$ (1)**	**$ -**
	Floating rate liabilities	**175**	**(49)**	**-**
Equity contracts	Stock-based compensation	**2**	**6**	**-**
Total		**$ 176**	**$ (44)**	**$ -**

For the year ended December 31, 2021	Hedged items in qualifying cash flow hedging relationships	Gains (losses) deferred in AOCI on derivatives	Gains (losses) reclassified from AOCI into investment income	Ineffectiveness recognized in investment income
Foreign currency swaps	Fixed rate assets	$ (1)	$ (1)	$ -
	Floating rate liabilities	89	3	-
Equity contracts	Stock-based compensation	5	5	-
Total		$ 93	$ 7	$ -

The Company anticipates that net losses of approximately $8 will be reclassified from AOCI to net income within the next 12 months. The maximum time frame for which variable cash flows are hedged is 14 years.

Hedges of net investments in foreign operations

The Company primarily uses forward currency contracts, cross currency swaps and non-functional currency denominated debt to manage its foreign currency exposures to net investments in foreign operations.

The effects of net investment hedging relationships on the Consolidated Statements of Income and the Consolidated Statements of Other Comprehensive Income are shown in the following table.

For the year ended December 31, 2022		Gains (losses) deferred in AOCI		Gains (losses) reclassified from AOCI into investment income		Ineffectiveness recognized in investment income
Foreign currency swaps	**$**	**(96)**	**$**	**-**	**$**	**-**
Forward contracts		**14**		**-**		**-**
Total	**$**	**(82)**	**$**	**-**	**$**	**-**

For the year ended December 31, 2021		Gains (losses) deferred in AOCI		Gains (losses) reclassified from AOCI into investment income		Ineffectiveness recognized in investment income
Foreign currency swaps	$	(34)	$	-	$	-
Forward contracts		59		-		-
Total	$	25	$	-	$	-

(c) Derivatives not designated in qualifying hedge accounting relationships

Derivatives used in portfolios supporting insurance contract liabilities are generally not designated in qualifying hedge accounting relationships because the change in the value of the insurance contract liabilities economically hedged by these derivatives is recorded through net income. Since changes in fair value of these derivatives and related hedged risks are recognized in investment income as they occur, they generally offset the change in hedged risk to the extent the hedges are economically effective. Interest rate and cross currency swaps are used in the portfolios supporting insurance contract liabilities to manage duration and currency risks.

Investment income on derivatives not designated in qualifying hedge accounting relationships

For the years ended December 31,		**2022**		2021
Interest rate swaps	**$**	**(3,428)**	$	(1,986)
Interest rate futures		**(431)**		(687)
Interest rate options		**(258)**		(133)
Foreign currency swaps		**1,158**		(155)
Currency rate futures		**(103)**		66
Forward contracts		**(7,558)**		(1,739)
Equity futures		**794**		(2,140)
Equity contracts		**(818)**		871
Credit default swaps		**-**		(2)
Total	**$**	**(10,644)**	$	(5,905)

(d) Embedded derivatives

Certain insurance contracts contain features that are classified as embedded derivatives and are measured separately at FVTPL, including reinsurance contracts related to guaranteed minimum income benefits and contracts containing certain credit and interest rate features.

Certain reinsurance contracts related to guaranteed minimum income benefits contain embedded derivatives requiring separate measurement at FVTPL as the financial component contained in the reinsurance contracts does not contain significant insurance risk. As at December 31, 2022, reinsurance ceded guaranteed minimum income benefits had a fair value of $585 (2021 – $734) and reinsurance assumed guaranteed minimum income benefits had a fair value of $65 (2021 – $86). Claims recovered under reinsurance ceded contracts offset claims expenses and claims paid on the reinsurance assumed are reported as contract benefits.

The Company's credit and interest rate embedded derivatives promise to pay the returns on a portfolio of assets to the contract holder. These embedded derivatives contain credit and interest rate risks that are financial risks embedded in the underlying insurance contract. As at December 31, 2022, these embedded derivatives had a fair value of $395 (2021 – $11).

Other financial instruments classified as embedded derivatives but exempt from separate measurement at fair value include variable universal life and variable life products' minimum guaranteed credited rates, no lapse guarantees, guaranteed annuitization options, CPI indexing of benefits, and segregated fund minimum guarantees other than reinsurance ceded/assumed guaranteed minimum income benefits. These embedded derivatives are measured and reported within insurance contract liabilities and are exempt from separate fair value measurement as they contain insurance risk and/or are closely related to the insurance host contract.

Note 6 Goodwill and Intangible Assets

(a) Change in the carrying value of goodwill and intangible assets

The following table presents the change in carrying value of goodwill and intangible assets.

As at December 31, 2022	Balance, January 1	Net additions/ (disposals)[1][2]	Amortization expense	Effect of changes in foreign exchange rates	Balance, December 31
Goodwill	**$ 5,651**	**$ 255**	**$ n/a**	**$ 108**	**$ 6,014**
Indefinite life intangible assets					
Brand	**761**	**-**	**n/a**	**52**	**813**
Fund management contracts and other[3]	**788**	**228**	**n/a**	**32**	**1,048**
	1,549	**228**	**n/a**	**84**	**1,861**
Finite life intangible assets[4]					
Distribution networks	**888**	**6**	**47**	**34**	**881**
Customer relationships	**687**	**-**	**56**	**12**	**643**
Software	**1,091**	**192**	**235**	**20**	**1,068**
Other	**49**	**7**	**6**	**2**	**52**
	2,715	**205**	**344**	**68**	**2,644**
Total intangible assets	**4,264**	**433**	**344**	**152**	**4,505**
Total goodwill and intangible assets	**$ 9,915**	**$ 688**	**$ 344**	**$ 260**	**$ 10,519**

As at December 31, 2021	Balance, January 1	Net additions/ (disposals)[5]	Amortization expense	Effect of changes in foreign exchange rates	Balance, December 31
Goodwill	$ 5,714	$ (5)	$ n/a	$ (58)	$ 5,651
Indefinite life intangible assets					
Brand	764	-	n/a	(3)	761
Fund management contracts and other[3]	796	(3)	n/a	(5)	788
	1,560	(3)	n/a	(8)	1,549
Finite life intangible assets[4]					
Distribution networks	806	131	44	(5)	888
Customer relationships	738	(2)	48	(1)	687
Software	1,059	198	148	(18)	1,091
Other	52	2	6	1	49
	2,655	329	246	(23)	2,715
Total intangible assets	4,215	326	246	(31)	4,264
Total goodwill and intangible assets	$ 9,929	$ 321	$ 246	$ (89)	$ 9,915

(1) In November 2022, the Company acquired control of Manulife TEDA Fund Management Company, LTD. through the purchase of the remaining 51% of shares that it did not already own from its joint venture partner. The transaction included cash consideration of $334 and derecognition of the Company's previous joint venture interest with a fair value of $321. Goodwill, indefinite life fund management contracts and distribution networks, and finite life management contracts of $255, $185, $52 and $3 were recognized.

(2) In January 2022, the Company paid $256 to VietinBank for an extension of the life of the distribution agreement acquired from Aviva Plc in December 2021.

(3) Fund management contracts are mostly allocated to Canada WAM and U.S. WAM CGUs with carrying values of $273 (2021 – $273) and $397 (2021 – $371), respectively.

(4) Gross carrying amount of finite life intangible assets was $1,517 for distribution networks, $1,146 for customer relationships, $2,736 for software and $136 for other (2021 – $1,456, $1,132, $2,484 and $124), respectively.

[5] In December 2021, the Company purchased the Vietnamese operations of Aviva Plc including rights to an exclusive distribution agreement with VietinBank.

(b) Goodwill impairment testing

The Company completed its annual goodwill impairment testing in the fourth quarter of 2022 by determining the recoverable amounts of its businesses using valuation techniques discussed below (refer to notes 1(f) and 6(c)). The testing indicated that there was no impairment of goodwill in 2022 (2021 - $nil).

The following tables present the carrying value of goodwill by CGU or group of CGUs.

As at December 31, 2022 CGU or group of CGUs	Balance, January 1	Net additions/ (disposals)	Effect of changes in foreign exchange rates	Balance, December 31
Asia				
Asia Insurance (excluding Japan)	**$ 152**	**$ -**	**$ 10**	**$ 162**
Japan Insurance	**386**	**-**	**(26)**	**360**
Canada Insurance	**1,955**	**-**	**5**	**1,960**
U.S. Insurance	**336**	**-**	**24**	**360**
Global Wealth and Asset Management				
Asia WAM	**183**	**255**	**12**	**450**
Canada WAM	**1,436**	**-**	**-**	**1,436**
U.S. WAM	**1,203**	**-**	**83**	**1,286**
Total	**$ 5,651**	**$ 255**	**$ 108**	**$ 6,014**

As at December 31, 2021 CGU or group of CGUs	Balance, January 1	Net additions/ (disposals)	Effect of changes in foreign exchange rates	Balance, December 31
Asia				
Asia Insurance (excluding Japan)	$ 159	$ (5)	$ (2)	$ 152
Japan Insurance	433	-	(47)	386
Canada Insurance	1,955	-	-	1,955
U.S. Insurance	338	-	(2)	336
Global Wealth and Asset Management				
Asia WAM	185	-	(2)	183
Canada WAM	1,436	-	-	1,436
U.S. WAM	1,208	-	(5)	1,203
Total	$ 5,714	$ (5)	$ (58)	$ 5,651

The valuation techniques, significant assumptions and sensitivities, where applicable, applied in the goodwill impairment testing are described below.

(c) Valuation techniques

When determining if a CGU is impaired, the Company compares its recoverable amount to the allocated capital for that unit, which is aligned with the Company's internal reporting practices. The recoverable amounts were based on fair value less costs to sell ("FVLCS") for Asia Insurance (excluding Japan) and Asia WAM. For other CGUs, value-in-use ("VIU") was used.

Under the FVLCS approach, the Company determines the fair value of the CGU or group of CGUs using an earnings-based approach which incorporates forecasted earnings, excluding interest and equity market impacts and normalized new business expenses multiplied by an earnings-multiple derived from the observable price-to-earnings multiples of comparable financial institutions. The price-to-earnings multiple used by the Company for testing was 11.6 (2021 – 11.6). These FVLCS valuations are categorized as Level 3 of the fair value hierarchy (2021 – Level 3).

Under the VIU approach, used for CGUs with insurance business, an embedded appraisal value is determined from a projection of future distributable earnings derived from both the in-force business and new business expected to be sold in the future, and therefore, reflects the economic value for each CGU's or group of CGUs' profit potential under a set of assumptions. This approach requires assumptions including sales and revenue growth rates, capital requirements, interest rates, equity returns, mortality, morbidity, policyholder behaviour, tax rates and discount rates. For non-insurance CGUs, the VIU is based on discounted cash flow analysis which incorporates relevant aspects of the embedded appraisal value approach.

(d) Significant assumptions

To calculate embedded appraisal value, the Company discounted projected earnings from in-force contracts and valued 20 years of new business growing at expected plan levels, consistent with the periods used for forecasting long-term businesses such as insurance. In arriving at its projections, the Company considered past experience, economic trends such as interest rates, equity returns and product mix as well as industry and market trends. Where growth rate assumptions for new business cash flows were used in the embedded appraisal value calculations, they ranged from zero per cent to nine per cent (2021 – zero per cent to six per cent).

Interest rate assumptions are based on prevailing market rates at the valuation date.

For 2022, tax rates applied to the projections include the impact of internal reinsurance treaties and amounted to 28.0 per cent, 27.5 per cent and 21.0 per cent for the Japan, Canada and U.S. jurisdictions, respectively. For 2021, tax rates applied to the projections include the impact of internal reinsurance treaties and amounted to 28.0 per cent, 26.5 per cent and 21.0 per cent for the Japan, Canada, and U.S. jurisdictions, respectively. Tax assumptions are sensitive to changes in tax laws as well as assumptions about the jurisdictions in which profits are earned. It is possible that actual tax rates could differ from those assumed.

Discount rates assumed in determining the value-in-use for applicable CGUs or group of CGUs ranged from 10.0 per cent to 12.0 per cent on an after-tax basis or 12.5 per cent to 15.0 per cent on a pre-tax basis (2021 – 8.0 per cent to 10.1 per cent on an after-tax basis or 10.0 per cent to 12.7 per cent on a pre-tax basis).

Key assumptions may change as economic and market conditions change, which may lead to impairment charges in the future. Adverse changes in discount rates (including from changes in interest rates) and growth rate assumptions for new business cash flow projections used in the determination of embedded appraisal values or reductions in market-based earnings multiples calculations may result in impairment charges in the future which could be material.

Note 7 Insurance Contract Liabilities and Reinsurance Assets

(a) Insurance contract liabilities and reinsurance assets

Insurance contract liabilities are reported gross of reinsurance ceded and the ceded liabilities are reported separately as reinsurance assets. Insurance contract liabilities include actuarial liabilities, benefits payable, provision for unreported claims and policyholder amounts on deposit. The components of gross and net insurance contract liabilities are shown below.

As at December 31,	**2022**	2021
Insurance contract liabilities	**$ 352,153**	$ 374,890
Benefits payable and provision for unreported claims	**5,610**	5,251
Policyholder amounts on deposit	**13,642**	12,134
Gross insurance contract liabilities	**371,405**	392,275
Reinsurance assets[1]	**(47,674)**	(44,531)
Net insurance contract liabilities	**$ 323,731**	$ 347,744

[1] Reinsurance assets of $38 (2021 – $48) are related to investment contract liabilities, refer to note 8(b).

Net insurance contract liabilities represent the amount which, together with estimated future premiums and net investment income, will be sufficient to pay estimated future benefits, policyholder dividends and refunds, taxes (other than income taxes) and expenses on policies in-force net of reinsurance premiums and recoveries.

Net insurance contract liabilities are determined using CALM, as required by the Canadian Institute of Actuaries.

The determination of net insurance contract liabilities is based on an explicit projection of cash flows using current assumptions for each material cash flow item. Investment returns are projected using the current asset portfolios and projected reinvestment strategies.

Each assumption is based on the best estimate adjusted by a margin for adverse deviation. For fixed income returns, this margin is established by scenario testing a range of prescribed and company-developed scenarios consistent with Canadian

Actuarial Standards of Practice. For all other assumptions, this margin is established by directly adjusting the best estimate assumption.

Cash flows used in the net insurance contract liabilities valuation adjust the gross policy cash flows to reflect projected cash flows from ceded reinsurance. The cash flow impact of ceded reinsurance varies depending upon the amount of reinsurance, the structure of reinsurance treaties, the expected economic benefit from treaty cash flows and the impact of margins for adverse deviation. Gross insurance contract liabilities are determined by discounting gross policy cash flows using the same discount rate as the net CALM model discount rate.

The reinsurance asset is determined by taking the difference between the gross insurance contract liabilities and the net insurance contract liabilities. The reinsurance asset represents the benefit derived from reinsurance arrangements in force at the date of the Consolidated Statements of Financial Position.

The period used for the projection of cash flows is the policy lifetime for most individual insurance contracts. For other types of contracts, a shorter projection period may be used, with the contract generally ending at the earlier of the first renewal date on or after the Consolidated Statements of Financial Position date where the Company can exercise discretion in renewing its contractual obligations or terms of those obligations and the renewal or adjustment date that maximizes the insurance contract liabilities. For segregated fund products with guarantees, the projection period is generally set as the period that leads to the largest insurance contract liability. Where the projection period is less than the policy lifetime, insurance contract liabilities may be reduced by an allowance for acquisition expenses expected to be recovered from policy cash flows beyond the projection period used for the liabilities. Such allowances are tested for recoverability using assumptions that are consistent with other components of the actuarial valuation.

(b) Composition

The composition of insurance contract liabilities and reinsurance assets by the line of business and reporting segment is as follows.

Gross insurance contract liabilities

	Individual insurance						
As at December 31, 2022	Participating	Non-participating	Annuities and pensions	Other insurance contract liabilities[1]	Total, net of reinsurance ceded	Total reinsurance ceded	Total, gross of reinsurance ceded
Asia	**$ 66,294**	**$ 34,684**	**$ 6,221**	**$ 4,142**	**$ 111,341**	**$ 2,727**	**$ 114,068**
Canada	**12,637**	**38,325**	**13,593**	**14,095**	**78,650**	**1,676**	**80,326**
U.S.	**7,867**	**67,789**	**11,273**	**46,849**	**133,778**	**43,137**	**176,915**
Corporate and Other	**-**	**(640)**	**24**	**578**	**(38)**	**134**	**96**
Total, net of reinsurance ceded	**86,798**	**140,158**	**31,111**	**65,664**	**323,731**	**$ 47,674**	**$ 371,405**
Total reinsurance ceded	**8,552**	**22,434**	**15,793**	**895**	**47,674**		
Total, gross of reinsurance ceded	**$ 95,350**	**$ 162,592**	**$ 46,904**	**$ 66,559**	**$ 371,405**		

	Individual insurance						
As at December 31, 2021	Participating	Non-participating	Annuities and pensions	Other insurance contract liabilities[1]	Total, net of reinsurance ceded	Total reinsurance ceded	Total, gross of reinsurance ceded
Asia	$ 64,586	$ 36,387	$ 6,869	$ 3,590	$ 111,432	$ 2,749	$ 114,181
Canada	13,518	44,320	16,554	14,981	89,373	430	89,803
U.S.	8,591	71,077	14,007	53,555	147,230	41,150	188,380
Corporate and Other	-	(676)	22	363	(291)	202	(89)
Total, net of reinsurance ceded	86,695	151,108	37,452	72,489	347,744	$ 44,531	$ 392,275
Total reinsurance ceded	8,144	20,767	14,681	939	44,531		
Total, gross of reinsurance ceded	$ 94,839	$ 171,875	$ 52,133	$ 73,428	$ 392,275		

(1) Other insurance contract liabilities include group insurance and individual and group health including long-term care insurance.

Separate sub-accounts were established for participating policies in-force at the demutualization of MLI and John Hancock Mutual Life Insurance Company. These sub-accounts permit this participating business to be operated as separate “closed blocks” of participating policies. As at December 31, 2022, $26,289 (2021 – $29,000) of both reinsurance assets and insurance contract liabilities were related to these closed blocks of participating policies.

(c) Assets backing insurance contract liabilities, other liabilities and capital

Assets are segmented and matched to liabilities with similar underlying characteristics by product line and major currency. The Company has established target investment strategies and asset mixes for each asset segment supporting insurance contract liabilities which consider the risk attributes of the liabilities supported by the assets and expectations of market performance. Liabilities with rate and term guarantees are predominantly backed by fixed-rate instruments on a cash flow matching basis for a targeted duration horizon. Longer duration cash flows on these liabilities as well as on adjustable products such as participating life insurance are backed by a broader range of asset classes, including equity and alternative long-duration investments. The Company's capital is invested in a range of debt and equity investments, both public and private.

Changes in the fair value of assets backing net insurance contract liabilities, that the Company considers to be other than temporary, would have a limited impact on the Company's net income wherever there is an effective matching of assets and liabilities, as these changes would be substantially offset by corresponding changes in the value of net insurance contract liabilities. The fair value of assets backing net insurance contract liabilities as at December 31, 2022, excluding reinsurance assets, was estimated at $317,854 (2021 – $354,587).

As at December 31, 2022, the fair value of assets backing capital and other liabilities was estimated at $524,329 (2021 – $571,998).

The following table presents the carrying value of assets backing net insurance contract liabilities, other liabilities and capital.

	Individual insurance						
As at December 31, 2022	Participating	Non-participating	Annuities and pensions	Other insurance contract liabilities(1)	Other liabilities(2)	Capital(3)	Total
Assets							
Debt securities	**$ 42,279**	**$ 72,706**	**$ 15,686**	**$ 31,998**	**$ 9,739**	**$ 31,496**	**$ 203,904**
Public equities	**12,253**	**6,792**	**336**	**562**	**675**	**2,901**	**23,519**
Mortgages	**4,378**	**14,101**	**4,350**	**8,766**	**22,997**	**46**	**54,638**
Private placements	**6,810**	**19,498**	**8,038**	**10,497**	**2,003**	**211**	**47,057**
Real estate	**3,346**	**7,030**	**913**	**1,875**	**(66)**	**174**	**13,272**
Other	**17,732**	**20,031**	**1,788**	**11,966**	**421,048**	**34,018**	**506,583**
Total	**$ 86,798**	**$ 140,158**	**$ 31,111**	**$ 65,664**	**$ 456,396**	**$ 68,846**	**$ 848,973**

	Individual insurance						
As at December 31, 2021	Participating	Non-participating	Annuities and pensions	Other insurance contract liabilities(1)	Other liabilities(2)	Capital(3)	Total
Assets							
Debt securities	$ 43,278	$ 82,050	$ 19,575	$ 36,207	$ 10,723	$ 32,306	$ 224,139
Public equities	14,667	8,112	453	374	626	3,835	28,067
Mortgages	3,799	13,295	4,572	8,526	21,802	20	52,014
Private placements	6,005	17,741	7,370	9,775	1,723	228	42,842
Real estate	3,467	6,814	987	1,782	6	177	13,233
Other	15,479	23,096	4,495	15,825	464,048	34,972	557,915
Total	$ 86,695	$ 151,108	$ 37,452	$ 72,489	$ 498,928	$ 71,538	$ 918,210

(1) Other insurance contract liabilities include group insurance and individual and group health including long-term care insurance.
(2) Other liabilities are non-insurance contract liabilities which include segregated funds, bank deposits, long-term debt, deferred tax liabilities, derivatives, investment contracts, embedded derivatives and other miscellaneous liabilities.
(3) Capital is defined in note 12.

(d) Significant insurance contract liability valuation assumptions

The determination of insurance contract liabilities involves the use of estimates and assumptions. Insurance contract liabilities have two major components: a best estimate amount and a provision for adverse deviation.

Best estimate assumptions

Best estimate assumptions are made with respect to mortality and morbidity, investment returns, rates of policy termination, operating expenses and certain taxes. Actual experience is monitored to ensure that assumptions remain appropriate and assumptions are changed as warranted. Assumptions are discussed in more detail in the following table.

Nature of factor and assumption methodology		Risk management
Mortality and morbidity	Mortality relates to the occurrence of death. Mortality is a key assumption for life insurance and certain forms of annuities. Mortality assumptions are based on the Company's internal experience as well as past and emerging industry experience. Assumptions are differentiated by sex, underwriting class, policy type and geographic market. Assumptions are made for future mortality improvements. Morbidity relates to the occurrence of accidents and sickness for insured risks. Morbidity is a key assumption for long-term care insurance, disability insurance, critical illness and other forms of individual and group health benefits. Morbidity assumptions are based on the Company's internal experience as well as past and emerging industry experience and are established for each type of morbidity risk and geographic market. Assumptions are made for future morbidity improvements.	The Company maintains underwriting standards to determine the insurability of applicants. Claim trends are monitored on an ongoing basis. Exposure to large claims is managed by establishing policy retention limits, which vary by market and geographic location. Policies in excess of the limits are reinsured with other companies. Mortality is monitored monthly and the overall 2022 experience was unfavourable (2021 – unfavourable) when compared to the Company's assumptions. Morbidity is also monitored monthly and the overall 2022 experience was favourable (2021 – favourable) when compared to the Company's assumptions.
Investment returns	The Company segments assets to support liabilities by business segment and geographic market and establishes investment strategies for each liability segment. Projected cash flows from these assets are combined with projected cash flows from future asset purchases/sales to determine expected rates of return on these assets for future years. Investment strategies are based on the target investment policies for each segment and the reinvestment returns are derived from current and projected market rates for fixed income investments and a projected outlook for other alternative long-duration assets. Investment return assumptions include expected future credit losses on fixed income investments. Credit losses are projected based on past experience of the Company and industry as well as specific reviews of the current investment portfolio. Investment return assumptions for each asset class and geographic market also incorporate expected investment management expenses that are derived from internal cost studies. The costs are attributed to each asset class to develop unitized assumptions per dollar of asset for each asset class and geographic market.	The Company's policy of closely matching asset cash flows with those of the corresponding liabilities is designed to mitigate the Company's exposure to future changes in interest rates. The interest rate risk positions in business segments are monitored on an ongoing basis. Under CALM, the reinvestment rate is developed using interest rate scenario testing and reflects the interest rate risk positions. In 2022, the movement in interest rates positively (2021 – negatively) impacted the Company's net income. This positive impact was primarily due to increase in risk-free interest rates in the U.S., Canada, and Asia. The exposure to credit losses is managed against policies that limit concentrations by issuer, corporate connections, ratings, sectors and geographic regions. On participating policies and some non-participating policies, credit loss experience is passed back to policyholders through the investment return crediting formula. For other policies, premiums and benefits reflect the Company's assumed level of future credit losses at contract inception or most recent contract adjustment date. The Company holds explicit provisions in actuarial liabilities for credit risk including provisions for adverse deviation. In 2022, credit loss experience on debt securities and mortgages was favourable (2021 – favourable) when compared to the Company's assumptions. Equities, real estate and other alternative long-duration assets are used to support liabilities where investment return experience is passed back to policyholders through dividends or credited investment return adjustments. Equities, real estate, and other alternative long-duration assets are also used to support long-dated obligations in the Company's annuity and pension businesses and for long-dated insurance obligations on contracts where the investment return risk is borne by the Company.

Nature of factor and assumption methodology		Risk management
		In 2022, investment experience related to alternative long-duration assets backing policyholder liabilities was favourable (2021 – favourable) primarily driven by gains in private equities, timber and agriculture properties, partially offset by losses in real estate properties. In 2022, alternative long-duration asset origination exceeded (2021 – did not exceed) valuation requirements. In 2022, for the business that is dynamically hedged, segregated fund guarantee experience on residual, non-dynamically hedged market risks were unfavourable (2021 – unfavourable). For the business that is not dynamically hedged, experience on segregated fund guarantees due to changes in the market value of assets under management was also unfavourable (2021 – unfavourable). This excludes the experience on the macro equity hedges. In 2022, investment expense experience was favourable (2021 – unfavourable) when compared to the Company's assumptions.
Policy termination and premium persistency	Policies are terminated through 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 the Company's recent experience adjusted for expected future conditions. Assumptions reflect differences by type of contract within each geographic market.	The Company seeks to design products that minimize financial exposure to lapse, surrender and premium persistency risk. The Company monitors lapse, surrender and persistency experience. In aggregate, 2022 policyholder termination and premium persistency experience was unfavourable (2021 – unfavourable) when compared to the Company's assumptions used in the computation of actuarial liabilities.
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 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 grow. 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.	The Company prices its products to cover the expected costs of servicing and maintaining them. In addition, the Company monitors expenses monthly, including comparisons of actual expenses to expense levels allowed for in pricing and valuation. Maintenance expenses for 2022 were unfavourable (2021 – unfavourable) when compared to the Company's assumptions used in the computation of actuarial liabilities. The Company prices its products to cover the expected cost of taxes.
Policyholder dividends, experience rating refunds, and other adjustable policy elements	The best estimate projections for policyholder dividends and experience rating refunds, and other adjustable elements of policy benefits are determined to be consistent with management's expectation of how these elements will be managed should experience emerge consistently with the best estimate assumptions used for mortality and morbidity, investment returns, rates of policy termination, operating expenses and taxes.	The Company monitors policy experience and adjusts policy benefits and other adjustable elements to reflect this experience. Policyholder dividends are reviewed annually for all businesses under a framework of Board-approved policyholder dividend policies.
Foreign currency	Foreign currency risk results from a mismatch of the currency of liabilities and the currency of the assets designated to support these obligations. 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 foreign exchange rates.	The Company generally matches the currency of its assets with the currency of the liabilities they support, with the objective of mitigating the risk of loss arising from movements in currency exchange rates.

The Company reviews actuarial methods and assumptions on an annual basis. If changes are made to assumptions (refer to note 7(h)), the full impact is recognized in income immediately.

(e) Sensitivity of insurance contract liabilities to changes in non-economic assumptions

The sensitivity of net income attributed to shareholder to changes in non-economic assumptions underlying insurance contract liabilities is shown below, assuming a simultaneous change in the assumption across all business units. The sensitivity of net income attributed to shareholder to a deterioration or improvement in non-economic assumptions for Long-Term Care ("LTC") as at December 31, 2022 is also shown below.

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; changes in business mix, effective tax rates and other market factors; and the general limitations of internal models.

Potential impact on net income attributed to shareholder arising from changes to non-economic assumptions[1]

	Decrease in after-tax net income attributed to shareholder	
As at December 31,	**2022**	2021
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]	**(4,500)**	(5,500)
10% adverse change in future policy termination rates[4]	**(2,200)**	(2,400)
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 shareholder 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 shareholder.
(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 adverse 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, the Company would plan to file for rate increases equal to the amount of deterioration resulting from the sensitivities.
(5) 5% deterioration in incidence rates and 5% deterioration in claim termination rates.

Potential impact on net income attributed to shareholder arising from changes to non-economic assumptions for Long-Term Care included in the above table[1],[2]

	Decrease in after-tax net income attributed to shareholder	
As at December 31,	**2022**	2021
Policy related assumptions		
2% adverse change in future mortality rates	**$ (300)**	$ (300)
5% adverse change in future morbidity incidence rates	**(1,700)**	(2,000)
5% adverse change in future morbidity claims termination rates	**(2,400)**	(3,100)
10% adverse change in future policy termination rates	**(300)**	(400)
5% increase in future expense levels	**(100)**	(100)

(1) The impacts of the adverse 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, the Company would plan to file for rate increases equal to the amount of deterioration resulting from the sensitivities.
(2) The impact of favourable changes to all the sensitivities is relatively symmetrical.

(f) Provision for adverse deviation assumptions

The assumptions made in establishing insurance contract liabilities reflect expected best estimates of future experience. To recognize the uncertainty in these best estimate assumptions, to allow for possible misestimation of and deterioration in experience and to provide a greater degree of assurance that the insurance contract liabilities are adequate to pay future benefits, the Appointed Actuary is required to include a margin in each assumption.

Margins are released into future earnings as the policy is released from risk. 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 the 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.

Specific guidance is also provided for other risks such as market, credit, mortality and morbidity risks. For other risks which are not specifically addressed by the Canadian Institute of Actuaries, a range is provided of five per cent to 20 per cent of the expected experience assumption. The Company uses assumptions within the permissible ranges, with the determination of the level set considering the risk profile of the business. On occasion, in specific circumstances for additional prudence, a margin may exceed the high end of the range, which is permissible under the Canadian Actuarial Standards of Practice. This additional margin would be released if the specific circumstances which led to it being established were to change.

Each margin is reviewed annually for continued appropriateness.

(g) Change in insurance contract liabilities

The change in insurance contract liabilities was a result of the following business activities and changes in actuarial estimates.

For the year ended December 31, 2022	Net actuarial liabilities	Other insurance contract liabilities(1)	Net insurance contract liabilities	Reinsurance assets	Gross insurance contract liabilities
Balance, January 1	**$ 332,272**	**$ 15,472**	**$ 347,744**	**$ 44,531**	**$ 392,275**
New policies(2)	**5,365**	**-**	**5,365**	**116**	**5,481**
Normal in-force movement(2)	**(39,174)**	**1,216**	**(37,958)**	**(1,042)**	**(39,000)**
Changes in methods and assumptions(2)	**112**	**(192)**	**(80)**	**349**	**269**
Reinsurance transactions(2),(3)	**(2,419)**	**-**	**(2,419)**	**950**	**(1,469)**
Impact of changes in foreign exchange rates	**10,439**	**640**	**11,079**	**2,770**	**13,849**
Balance, December 31	**$ 306,595**	**$ 17,136**	**$ 323,731**	**$ 47,674**	**$ 371,405**

For the year ended December 31, 2021	Net actuarial liabilities	Other insurance contract liabilities(1)	Net insurance contract liabilities	Reinsurance assets	Gross insurance contract liabilities
Balance, January 1	$ 325,408	$ 14,377	$ 339,785	$ 45,769	$ 385,554
New policies(4)	5,947	-	5,947	276	6,223
Normal in-force movement(4)	4,689	1,283	5,972	(1,812)	4,160
Changes in methods and assumptions(4)	287	-	287	455	742
Reinsurance transactions	-	-	-	-	-
Impact of changes in foreign exchange rates	(4,059)	(188)	(4,247)	(157)	(4,404)
Balance, December 31	$ 332,272	$ 15,472	$ 347,744	$ 44,531	$ 392,275

(1) Other insurance contract liabilities are comprised of benefits payable and provisions for unreported claims and policyholder amounts on deposit.

(2) In 2022, the $34,971 decrease reported as the change in insurance contract liabilities on the 2022 Consolidated Statements of Income primarily consists of changes due to normal in-force movement, new policies, changes in methods and assumptions, and reinsurance transactions. These four items in the gross insurance contract liabilities were netted off by a decrease of $34,719, of which $35,830 is included in the Consolidated Statements of Income as a decrease in insurance contract liabilities and $1,111 increase is included in gross claims and benefits. The Consolidated Statements of Income change in insurance contract liabilities also includes the change in embedded derivatives associated with insurance contracts, however these embedded derivatives are included in other liabilities on the Consolidated Statements of Financial Position.

(3) In 2022, the Company completed two transactions to reinsure blocks of legacy U.S. variable annuity ("VA") policies. Under the terms of the transactions, the Company will retain responsibility for the maintenance of the policies with no intended impact to VA policyholders. The transactions were structured as coinsurance for the general fund liabilities and modified coinsurance for the segregated fund liabilities.

(4) In 2021, the $10,719 increase reported as the change in insurance contract liabilities on the Consolidated Statements of Income primarily consists of changes due to normal in-force movement, new policies and changes in methods and assumptions. These three items in the gross insurance contract liabilities were netted off by an

increase of $11,125, of which $9,868 is included in the Consolidated Statements of Income increase in insurance contract liabilities and $1,257 is included in gross claims and benefits. The Consolidated Statements of Income change in insurance contract liabilities also includes the change in embedded derivatives associated with insurance contracts.

(h) 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 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 for adverse deviations 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 materially impact the measurement of insurance contract liabilities.

2022 Review of Actuarial Methods and Assumptions

The completion of the 2022 annual review of actuarial methods and assumptions resulted in a decrease in insurance contract liabilities, net of reinsurance, of $80, and a net gain to net income attributed to shareholder of $36 post-tax.

	Change in insurance contract liabilities, net of reinsurance			
For the year ended December 31, 2022	Total	Attributed to participating policyholders' account[1]	Attributed to shareholder's account	Change in net income attributed to shareholder (post-tax)
Long-term care triennial review	**$ 19**	**$ -**	**$ 19**	**$ (15)**
Mortality and morbidity updates	**157**	**(5)**	**162**	**(126)**
Lapses and policyholder behaviour updates	**317**	**74**	**243**	**(192)**
Investment related updates	**(210)**	**(1)**	**(209)**	**157**
Other updates	**(363)**	**(145)**	**(218)**	**212**
Net impact	**$ (80)**	**$ (77)**	**$ (3)**	**$ 36**

[1] The change in insurance contract liabilities, net of reinsurance, attributable to the participating policyholders' account was primarily driven by an increase in expected long-term interest rates within the valuation models to reflect the higher interest rate environment, partially offset by the lapse assumption update in Canada.

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, as well as the progress on future premium rate increases. The impact of the LTC review resulted in a net $15 post-tax charge to net income attributed to shareholder.

The experience study showed that claim costs established in the last triennial review remain appropriate in aggregate for the older blocks of business[1] supported by robust claims data on this mature block. Insurance contract liabilities were strengthened for claim costs on the newer block of business[2]. This was driven by lower active life mortality[3] supported by Company experience and a recent industry study, as well as higher utilization of benefits, which included the impact of reflecting higher inflation in the cost-of-care up to the current year. The Company also reviewed and updated incidence and claim termination assumptions which, on a net basis, provided a partial offset to the increase in insurance contract liabilities on active life mortality and utilization. In addition, some policyholders are electing to reduce their benefits in lieu of paying increased premiums which resulted in a reduction in insurance contract liabilities. The overall claims experience review led to a post-tax charge to net income attributed to shareholder of approximately $2.3 billion (US$1.7 billion).

Experience continues to support the assumptions of both future morbidity and mortality improvement, resulting in no changes to these assumptions.

As of September 30, 2022, the Company has received actual premium increase approvals of $2.5 billion pre-tax (US$1.9 billion pre-tax) on a present value basis since the last triennial review in 2019. This aligns with the full amount assumed in the Company's insurance contract liabilities at that time and demonstrates the Company's continued strong track record of progress in securing premium rate increases[4]. In 2022, the review of future premium increases assumed in insurance contract liabilities resulted in a post-tax gain to net income attributed to shareholder of approximately $2.1 billion (US$1.6

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[1] First generation policies issued prior to 2002.
[2] Second generation policies with an average issue date of 2007 and Group policies with an average issue date of 2003.
[3] The mortality rate of LTC policyholders who are currently not on claim.
[4] Actual experience obtaining premium increases could be materially different than what the Company has assumed, resulting in further increases or decreases in insurance contract liabilities, which could be material.

billion). This reflects expected future premium increases that are due to the Company's 2022 review of morbidity, mortality, and lapse assumptions, as well as outstanding amounts from prior state filings. Premium increases averaging approximately 30% will be sought on about one-half of the business, excluding the carryover of 2019 amounts requested. The Company's assumptions reflect the estimated timing and amount of state approved premium increases.

Other refinements to LTC valuation resulted in a post-tax gain of approximately $0.2 billion (US$0.2 billion) to net income attributed to shareholder.

Mortality and morbidity updates

Mortality and morbidity updates resulted in a $126 post-tax charge to net income attributed to shareholder, driven by a detailed review of the mortality and morbidity assumptions for the Company's Canada insurance business, and by updates to morbidity assumptions in Vietnam to align with experience.

Lapses and policyholder behaviour updates

Updates to lapses and policyholder behaviour assumptions resulted in a $192 post-tax charge to net income attributed to shareholder.

The Company completed a detailed review of lapse assumptions for Singapore, and increased lapse rates to align with experience on index-linked products, which reduced projected future fee income to be received on these products.

The Company also increased lapse rates on Canada's term insurance products for policies approaching their renewal date, reflecting emerging experience in the Company's study.

Investment-related updates

Updates to investment return assumptions resulted in a $157 post-tax gain to net income attributed to shareholder, primarily driven by annual updates to the Company's valuation models to reflect market movements during the year. No changes were made to the Company's long-term assumed returns.

Other updates

Other updates resulted in a $212 post-tax gain to net income attributed to shareholder, which included refinements to the projection of the Company's tax and liability cash flows, as well as various other modelling updates.

2021 Review of Actuarial Methods and Assumptions

The completion of the 2021 annual review of actuarial methods and assumptions resulted in an increase in insurance contract liabilities of $287, net of reinsurance, and a decrease in net income attributed to shareholder of $41 post-tax.

	Change in insurance contract liabilities, net of reinsurance			
For the year ended December 31, 2021	Total	Attributed to participating policyholders' account[1]	Attributed to shareholder's account	Change in net income attributed to shareholder (post-tax)
U.S. variable annuity product review	$ 51	$ -	$ 51	$ (40)
Mortality and morbidity updates	350	-	350	(257)
Lapses and policyholder behaviour updates	686	18	668	(534)
Expense updates	(653)	(25)	(628)	503
Investment related updates	(257)	(2)	(255)	168
Other updates	110	231	(121)	119
Net impact	$ 287	$ 222	$ 65	$ (41)

(1) The change in insurance contract liabilities, net of reinsurance, attributable to the participating policyholders' account was primarily driven by a reduction in the expected long-term interest rates within the valuation models to reflect the low interest rate environment.

U.S. variable annuity product review

The review of the Company's variable annuity products in the U.S. resulted in a $40 post-tax charge to net income attributed to shareholder.

The charge was primarily driven by updates to lapse assumptions to reflect emerging experience, partially offset by refinements to the Company's segregated fund guaranteed minimum withdrawal benefit valuation models.

Mortality and morbidity updates
Mortality and morbidity updates resulted in a $257 post-tax charge to net income attributed to shareholder.

The charge was driven by updates to older age mortality on certain products in the Company's U.S. life insurance business, mortality assumption updates in Indonesia to reflect recent experience, as well as from refining assumptions on several reinsurance arrangements in Canada.

Lapses and policyholder behaviour updates
Updates to lapses and policyholder behaviour assumptions resulted in a $534 post-tax charge to net income attributed to shareholder.

The Company completed a detailed review of lapse assumptions for non-participating policies within the Company's U.S. life insurance business including those for universal life, variable universal life, and term products. The Company observed a trend of low lapse rates on the protection-focused universal life insurance products as consumers continue to value the product guarantees in the prolonged low interest rate environment. The Company lowered the overall lapse assumptions for these products to reflect actual experience, which resulted in a post-tax charge to net income attributed to shareholder.

Other updates to lapse and policyholder behaviour assumptions were made across several products in Canada and Japan to reflect recent experience, resulting in a modest post-tax charge to net income attributed to shareholder.

Expense updates
Updates to expense assumptions resulted in a $503 post-tax gain to net income attributed to shareholder.

The Company completed a detailed review of the investment expense assumptions across the Company. This resulted in a $263 post-tax gain to net income attributed to shareholder, primarily driven by scale benefits.

The Company also completed a global expense study, which resulted in a $256 post-tax gain to net income attributed to shareholder. The favourable result primarily reflects a reallocation of expenses across certain business lines to align with actual experience, as well as from expense savings related to various expense efficiency initiatives.

Investment-related updates
Updates to investment return assumptions resulted in a $168 post-tax gain to net income attributed to shareholder.

The primary driver of the gain was an update to the Company's corporate bond default rates to reflect recent experience; the Company reduced default assumptions for certain credit ratings in Canada, the U.S., and Japan. This was partially offset by a reduction to the Company's Canadian real estate investment return assumptions.

Other updates
Other updates resulted in a $119 post-tax gain to net income attributed to shareholder.

This was primarily driven by Japan, whereby investment fees for certain mandates in the general account provided by affiliate investment managers were reviewed and updated to align with broader market levels.

(i) Insurance contracts contractual obligations
Insurance contracts give rise to obligations fixed by agreement. As at December 31, 2022, the Company's contractual obligations and commitments relating to insurance contracts are as follows.

Payments due by period	Less than 1 year	1 to 3 years	3 to 5 years	Over 5 years	Total
Insurance contract liabilities(1)	$ 11,498	$ 12,365	$ 18,496	$ 1,012,611	$ 1,054,970

(1) Insurance contract liability 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. Cash flows include embedded derivatives measured separately at fair value.

(j) Gross claims and benefits

The following table presents a breakdown of gross claims and benefits.

For the years ended December 31,		2022		2021
Death, disability and other claims	$	19,404	$	18,583
Maturity and surrender benefits		10,662		8,728
Annuity payments		3,242		3,276
Policyholder dividends and experience rating refunds		1,279		1,255
Net transfers from segregated funds		(1,267)		(732)
Total	$	33,320	$	31,110

(k) Reinsurance transaction

On November 15, 2021 and October 3, 2022, the Company, through its subsidiaries John Hancock Life Insurance Company (U.S.A.) ("JHUSA") and John Hancock Life Insurance Company of New York ("JHNY") entered into reinsurance agreements with Venerable Holdings, Inc. to reinsure blocks of legacy U.S. variable annuity ("VA") policies. Under the terms of the transactions, the Company will retain responsibility for the maintenance of the policies with no intended impact to VA policyholders. The transactions were structured as coinsurance for the general fund liabilities and modified coinsurance for the segregated fund liabilities.

The transactions closed on February 1, 2022 and October 3, 2022, respectively, resulting in a cumulative after-tax gain of $806, comprising a cumulative after-tax gain of $846 recognized in 2022, and a one-time after-tax loss of $40 recognized in the fourth quarter 2021.

Note 8 Investment Contract Liabilities

Investment contract liabilities are contractual obligations that do not contain significant insurance risk. These contracts are measured either at fair value or at amortized cost.

(a) Investment contract liabilities measured at fair value

Investment contract liabilities measured at fair value include certain investment savings and pension products sold primarily in Hong Kong and mainland China. The following table presents the movement in investment contract liabilities measured at fair value.

For the years ended December 31,		2022		2021
Balance, January 1	$	802	$	932
New policies		93		54
Changes in market conditions		(39)		(38)
Redemptions, surrenders and maturities		(106)		(138)
Impact of changes in foreign exchange rates		46		(8)
Balance, December 31	$	796	$	802

(b) Investment contract liabilities measured at amortized cost

Investment contract liabilities measured at amortized cost include several fixed annuity products sold in the U.S. and Canada that provide guaranteed income payments for a contractually determined period and are not contingent on survivorship.

The following table presents carrying and fair values of investment contract liabilities measured at amortized cost.

	2022		2021	
As at December 31,	Amortized cost, gross of reinsurance ceded[1]	Fair value	Amortized cost, gross of reinsurance ceded[1]	Fair value
U.S. fixed annuity products	$ 1,575	$ 1,547	$ 1,380	$ 1,602
Canadian fixed annuity products	877	956	935	1,016
Investment contract liabilities	$ 2,452	$ 2,503	$ 2,315	$ 2,618

[1] As at December 31, 2022, investment contract liabilities with the carrying value and fair value of $38 and $38, respectively (2021 – $48 and $52, respectively), were reinsured by the Company. The net carrying value and fair value of investment contract liabilities were $2,414 and $2,465 (2021 – $2,267 and $2,566), respectively.

The changes in investment contract liabilities measured at amortized cost was a result of the following business activities.

For the years ended December 31,	2022	2021
Balance, January 1	$ 2,315	$ 2,356
Policy deposits	200	92
Interest	67	71
Withdrawals	(236)	(191)
Fees	(1)	(1)
Other	-	(5)
Impact of changes in foreign exchange rates	107	(7)
Balance, December 31	$ 2,452	$ 2,315

Carrying value of fixed annuity products is amortized at a rate that exactly discounts the projected actual cash flows to the net carrying amount of the liability at the date of issue.

Fair value of fixed annuity products is determined by projecting cash flows according to the contract terms and discounting the cash flows at current market rates adjusted for the Company's own credit standing. As at December 31, 2022 and 2021, fair value of all investment contract liabilities was determined using Level 2 valuation techniques.

(c) Investment contracts contractual obligations

As at December 31, 2022, the Company's contractual obligations and commitments relating to the investment contracts are as follows.

Payments due by period	Less than 1 year	1 to 3 years	3 to 5 years	Over 5 years	Total
Investment contract liabilities[1]	$ 300	$ 511	$ 514	$ 3,365	$ 4,690

[1] Due to the nature of the products, the timing of net cash flows may be before contract maturity. Cash flows are undiscounted.

Note 9 Risk Management

Manulife offers insurance, wealth and asset management products and other financial services, which subjects the Company to a broad range of risks. Manulife manages these risks within an enterprise-wide risk management framework. Manulife's goal in managing risk is to strategically optimize risk taking and risk management to support long-term revenue, earnings and capital growth. Manulife seeks to achieve this by capitalizing on business opportunities and strategies with appropriate risk/return profiles; ensuring sufficient management expertise is in place to effectively execute strategies, and to identify, understand and manage underlying inherent risks; ensuring strategies and activities align with its corporate and ethical standards and operational capabilities; pursuing opportunities and risks that enhance diversification; and in making all risk taking decisions with analyses of inherent risks, risk controls and mitigations, and risk/return trade-off.

(a) 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 exchange rate movements. Market price volatility primarily relates to changes in prices of publicly traded equities and alternative long-duration assets. The profitability of the Company's insurance and annuity products, as well as the fees it earns in its investment management business, are subject to market risk.

Please read below for details on factors that could impact the level of market risk and the strategies used to manage this risk:

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. The Company's overall strategy to manage its market risks incorporates several component strategies, each targeted to manage one or more of the market risks arising from Manulife's businesses. At an enterprise level, these strategies are designed to manage the Company's aggregate exposures to market risks against limits associated with earnings and capital volatility.

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

Risk management strategy	Key market risk				
	Public equity risk	Interest rate and spread risk	Alternative long-duration asset 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					✓

Product design and pricing strategy

The Company's policies, standards, and guidelines with respect to product design and pricing are designed with the objective of aligning its product offerings with its risk-taking philosophy and risk appetite, and in particular, ensuring that incremental risk generated from new sales aligns with its strategic risk objectives and risk limits. The specific design features of Manulife's product offerings, including level of benefit guarantees, policyholder options, fund offerings and availability restrictions as well as its associated investment strategies, help to mitigate the level of underlying risk. Manulife regularly reviews and modifies key features within its product offerings, including premiums and fee charges with a goal of meeting profit targets and staying within risk limits. Certain of the Company's 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 Chief Risk Officer 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.

Manulife seeks to manage public equity risk arising from unhedged exposures in its insurance liabilities through the macro equity risk hedging strategy. The Company seeks to manage interest rate risk arising from variable annuity business not dynamically hedged through its 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 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 the hedge asset portfolio. The economic value of guarantees moves in close tandem, but not exactly, with the Company's variable annuity guarantee policy liabilities, as it reflects best estimate liabilities and does not include any liability provisions for adverse deviations.

The Company's 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. The Company may also utilize other derivatives with the objective to improve hedge effectiveness opportunistically.

The Company's 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 the Company's overall earnings sensitivity to public equity market movements within 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 guaranteed, adjustable liabilities and variable universal life; and
- Unhedged provisions for adverse deviation related to variable annuity guarantees dynamically hedged.

Asset liability management strategy

Manulife's asset liability management strategy is designed to help ensure that the market risks embedded in its 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. The Company seeks to align the asset strategy for each group to the premium and benefit patterns, policyholder options and guarantees, and crediting rate strategies of the products they support. 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.

Foreign exchange risk management strategy

Manulife's policy is to generally match the currency of its assets with the currency of the liabilities they support. Where assets and liabilities are not currency matched, the Company seeks to hedge this exposure where appropriate to stabilize its capital positions and remain within its enterprise foreign exchange risk limits.

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 the Company's 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 Manulife's liquidity ratios to remain strong. Manulife manages liquidity centrally and closely monitors the liquidity positions of principal subsidiaries.

Manulife seeks to mitigate liquidity risk by diversifying its business across different products, markets, geographical regions and policyholders. The Company designs insurance products to encourage policyholders to maintain their policies in-force, to help generate a diversified and stable flow of recurring premium income. The Company designs the policyholder termination features of wealth management products and related investment strategies with the goal of mitigating the financial exposure and liquidity risk related to unexpected policyholder terminations. The Company establishes and implements 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 total assets. Manulife aims to reduce liquidity risk in businesses by diversifying funding sources and appropriately managing the term structure of funding. The Company forecasts and monitors 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.

The Company also maintains centralized cash pools and access to other sources of liquidity and contingent liquidity such as repurchase funding agreements. Manulife's 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.

Manulife has established a variety of contingent liquidity sources. This includes a US$500 committed unsecured revolving credit facility with certain U.S. banks available to the Company, along with its parent and certain subsidiaries. There were no outstanding borrowings under these facilities as of December 31, 2022 (2021 – nil). In addition, JHUSA 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. As of December 31, 2022, JHUSA had an estimated maximum borrowing capacity of US$3.8 billion (2021 – US$4.4 billion) based on regulatory limitations with an outstanding balance of US$500 (2021 – US$500), under the FHLBI facility.

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

Maturity of financial liabilities(1)

As at December 31, 2022	Less than 1 year	1 to 3 years	3 to 5 years	Over 5 years	Total
Capital instruments	$ -	$ 615	$ -	$ 647	$ 1,262
Derivatives	2,656	1,996	1,163	8,551	14,366
Deposits from Bank clients(2)	16,884	3,000	2,623	-	22,507
Lease liabilities	112	154	93	61	420

(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, 2022 was $22,507 and $22,271, respectively (2021 – $20,720 and $20,746 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 (2021 – 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 $477.7 billion as at December 31, 2022 (2021 – $502.9 billion).

(b) Market risk sensitivities and market risk exposure measures

Variable annuity and segregated fund guarantees 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 guarantee values. Depending on future equity market levels, liabilities on current in-force business would be due primarily in the period from 2023 to 2043.

Manulife seeks to mitigate a portion of the risks embedded in its retained (i.e. net of reinsurance) variable annuity and segregated fund guarantee business through the combination of dynamic and macro hedging strategies (see "Publicly traded equity performance risk sensitivities and exposure measures" 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

	2022			2021		
As at December 31,	Guarantee value(1)	Fund value	Net amount at risk(1),(2),(3)	Guarantee value(1)	Fund value	Net amount at risk(1),(2),(3)
Guaranteed minimum income benefit	**$ 4,357**	**$ 2,723**	**$ 1,639**	$ 4,419	$ 3,603	$ 918
Guaranteed minimum withdrawal benefit	**38,319**	**34,203**	**5,734**	39,098	41,809	2,233
Guaranteed minimum accumulation benefit	**20,035**	**19,945**	**221**	19,820	20,226	12
Gross living benefits(4)	**62,711**	**56,871**	**7,594**	63,337	65,638	3,163
Gross death benefits(5)	**10,465**	**15,779**	**2,156**	11,105	22,920	618
Total gross of reinsurance	**73,176**	**72,650**	**9,750**	74,442	88,558	3,781
Living benefits reinsured	**26,999**	**23,691**	**4,860**	3,788	3,102	771
Death benefits reinsured	**3,923**	**2,636**	**1,061**	639	547	253
Total reinsured(6)	**30,922**	**26,327**	**5,921**	4,427	3,649	1,024
Total, net of reinsurance	**$ 42,254**	**$ 46,323**	**$ 3,829**	$ 70,015	$ 84,909	$ 2,757

(1) Guarantee Value and Net Amount at Risk in respect of guaranteed minimum withdrawal business in Canada and the U.S. have been updated in 2021 to reflect the time value of money of these claims.

(2) 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. 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 and assumes that all claims are immediately payable. In practice, guaranteed death benefits are contingent and only payable upon the eventual death of policyholders if fund values remain below guarantee values. For guaranteed minimum withdrawal benefit, the amount at risk assumes that the benefit is paid as a lifetime annuity commencing at the earliest contractual income start age. These benefits are also contingent and only payable at scheduled maturity/income start dates in the future, if the policyholders are still living and have not terminated their policies and fund values remain below guarantee values. For all guarantees, the amount at risk is floored at zero at the single contract level.

(3) The amount at risk net of reinsurance at December 31, 2022 was $3,829 million (2021 – $2,757 million) of which: US$737 million (2021 – US$1,336 million) was on the Company's U.S. business, $2,154 million (2021 – $886 million) was on Canadian business, US$275 million (2021 – US$53 million) was on Japan business and US$224 million (2021 – US$87 million) was related to Asia (other than Japan) and run-off reinsurance business.
(4) 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 5.
(5) Death benefits include standalone guarantees and guarantees in excess of living benefit guarantees where both death and living benefits are provided on a policy.
(6) Reinsured amounts at December 31, 2022 reflect the U.S. variable annuity reinsurance transactions effected on February 1, 2022 and October 3, 2022.

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, **Investment category**	**2022**	2021
Equity funds	**$ 42,506**	$ 52,528
Balanced funds	**36,290**	43,783
Bond funds	**9,336**	10,965
Money market funds	**1,924**	1,844
Other fixed interest rate investments	**2,029**	1,917
Total	**$ 92,085**	$ 111,037

Caution related to sensitivities

In the sections that follow, the Company provides 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 the Company's 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, the Company cannot provide assurance that the actual impact on net income attributed to shareholder will be as indicated.

Publicly traded equity performance risk sensitivities and exposure measures

The table below shows the potential impact on net income attributed to shareholder 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 shareholder could be considerably more than shown. The potential impact is shown after taking into account the impact of the change in markets on the hedge assets. While the Company 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, the Company makes certain assumptions for the purposes of estimating the impact on net income attributed to shareholder.

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, the Company assumes 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 Canadian Institute of Actuaries ("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 shareholder 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 shareholder arising from changes to public equity returns(1),(2)

As at December 31, 2022	-30%	-20%	-10%	+10%	+20%	+30%
Underlying sensitivity to net income attributed to shareholder(3)						
Variable annuity guarantees	**$ (1,100)**	**$ (660)**	**$ (300)**	**$ 240**	**$ 450**	**$ 610**
General fund equity investments(4)	**(1,520)**	**(1,010)**	**(500)**	**420**	**820**	**1,220**
Total underlying sensitivity before hedging	**(2,620)**	**(1,670)**	**(800)**	**660**	**1,270**	**1,830**
Impact of macro and dynamic hedge assets(5)	**850**	**530**	**240**	**(230)**	**(420)**	**(570)**
Net potential impact on net income attributed to shareholder after impact of hedging(6)	**$ (1,770)**	**$ (1,140)**	**$ (560)**	**$ 430**	**$ 850**	**$ 1,260**

As at December 31, 2021	-30%	-20%	-10%	+10%	+20%	+30%
Underlying sensitivity to net income attributed to shareholder(3)						
Variable annuity guarantees	$ (2,560)	$ (1,480)	$ (630)	$ 440	$ 750	$ 960
General fund equity investments(4)	(1,430)	(890)	(440)	450	880	1,320
Total underlying sensitivity before hedging	(3,990)	(2,370)	(1,070)	890	1,630	2,280
Impact of macro and dynamic hedge assets(5)	2,060	1,190	500	(470)	(820)	(1,110)
Net potential impact on net income attributed to shareholder after impact of hedging(6)	$ (1,930)	$ (1,180)	$ (570)	$ 420	$ 810	$ 1,170

(1) See "Caution related to sensitivities" above.

(2) The tables above show the potential impact on net income attributed to shareholder 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) 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.

(4) This impact for general fund equity investments includes general fund investments supporting the Company's policy liabilities, investment in seed money investments (in 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 shareholder as a result of changes in equity markets.

(5) 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).

(6) The sensitivity on net income attributed to shareholder from changes in public equity returns after the impact of hedging is largely unchanged as at December 31, 2022 compared with December 31, 2021. This is primarily driven by the decline in sensitivities in 1Q22 as a result of the U.S. variable annuity reinsurance transaction being largely offset by the net increase in sensitivities from the second quarter of 2022 ("2Q22") to 4Q22 as a result of the impact of equity market declines on the Company's variable universal life business projected fee income.

Interest rate and spread risk sensitivities and exposure measures

At December 31, 2022, the Company estimated the sensitivity of net income attributed to shareholder to a 50 basis point parallel decline in interest rates to be a charge of $100, and to a 50 basis point parallel increase in interest rates to be a benefit of $100.

The table below shows the potential impact on net income attributed to shareholder 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 (currently zero floor applies to all countries the Company operates in, except Japan), 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, sensitivities are not consistent across all regions in which the Company operates, 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 insurance liabilities are based on interest rate scenarios and calibration criteria set by the Canadian Actuarial Standards Board. 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 swaps may be greater than the decrease in the value of insurance liabilities. This could result in a charge to net income attributed to shareholder 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 interest rate and spread risk sensitivities are determined in isolation of each other and therefore do not reflect the combined impact of changes in government rates and credit spreads between government, swap and corporate rates occurring simultaneously. As a result, the impact of the summation of each individual sensitivity may be materially different from the impact of sensitivities to simultaneous changes in interest rate and spread risk.

The potential impact on net income attributed to shareholder does not take into account any future potential changes to the Company's URR assumptions or calibration criteria for stochastic risk-free rates. In 2021, the ASB issued a new promulgation 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 was effective October 15, 2021. At December 31, 2022, the Company estimated the sensitivity of net income attributed to shareholder 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 $300 (post-tax); and notes that the impact of changes to the URR are not linear. The long-term URR for risk-free rates in Canada is prescribed at 2.9% and the Company uses the same assumption for the U.S. The assumption for Japan is 1.5%.

The potential impact on net income attributable to shareholder 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 surplus assets. The impact on net income attributed to shareholder also does not reflect any unrealized gains or losses on AFS fixed income assets held in the 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 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 the Company 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 ALDA assets. Rising interest rates could negatively impact the value of ALDA assets. More information on ALDA can be found under the section "Alternative long-duration asset performance risk sensitivities and exposure measures", below.

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

Potential impact on net income attributed to shareholder of an immediate parallel change in interest rates relative to rates assumed in the valuation of policy liabilities[(1),(2),(3),(4)]

	2022		2021	
As at December 31,	-50bp	+50bp	-50bp	+50bp
Net income attributed to shareholder	**$ (100)**	**$ 100**	$ (200)	$ nil
Changes in other comprehensive income from fair value changes in AFS fixed income assets held in the Corporate and Other segment	**1,500**	**(1,400)**	2,100	(1,900)

(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.

The following tables show the potential impact on net income attributed to shareholder 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 shareholder arising from changes to corporate spreads and swap spreads relative to spreads assumed in the valuation of policy liabilities (1),(2),(3)

Corporate spreads(4),(5)	**2022**		2021	
As at December 31,	-50bp	+50bp	-50bp	+50bp
Net income attributed to shareholder(6)	**$ (100)**	**$ nil**	$ (600)	$ 500

Swap spreads	**2022**		2021	
As at December 31,	-20bp	+20bp	-20bp	+20bp
Net income attributed to shareholder	**$ nil**	**$ nil**	$ nil	$ nil

(1) See "Caution related to sensitivities" above.
(2) The impact on net income attributed to shareholder assumes no gains or losses are realized on 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 shareholder 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 sensitivity on net income attributed to shareholder due to changes in corporate spreads decreased significantly as at December 31, 2022 compared with December 31, 2021, as the rise in risk-free interest rates reduced projected reinvestments in the actuarial valuation models.

Alternative long-duration asset performance risk sensitivities and exposure measures

The following table shows the potential impact on net income attributed to shareholder 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 shareholder could be considerably more than shown.

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

Potential impact on net income attributed to shareholder arising from changes in ALDA returns relative to returns assumed in the valuation of policy liabilities(1),(2),(3),(4),(5)

	2022		2021	
As at December 31,	-10%	+10%	-10%	+10%
Net income attributed to shareholder				
Real estate, agriculture and timber assets	**$ (1,300)**	**$ 1,300**	$ (1,400)	$ 1,400
Private equities and other ALDA	**(1,600)**	**1,500**	(1,900)	1,800
Total(6)	**$ (2,900)**	**$ 2,800**	$ (3,300)	$ 3,200

(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 shareholder 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) The impact of changes to the portfolio asset mix supporting the Company's North American legacy businesses are reflected in the sensitivities when the changes take place.
(6) The decrease in net income sensitivity under each ALDA returns scenario was primarily driven by the increase in fixed income yields since December 31, 2021. This led to higher fixed income reinvestment rates relative to ALDA returns, which decreases the ALDA sensitivity because more fixed income assets are held compared to ALDA.

Foreign exchange risk sensitivities and exposure measures

The Company generally matches the currency of its assets with the currency of the insurance and investment contract liabilities they support, with the objective of mitigating risk of loss arising from foreign exchange rate changes. As at December 31, 2022, the Company did not have a material unmatched currency exposure.

Liquidity risk exposure strategy

Manulife manages 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 the Company's derivative portfolio is therefore regularly stress tested to assess the potential collateral and cash settlement requirements under various market conditions.

(c) Credit risk

Credit risk is the risk of loss due to inability or unwillingness of a borrower, or counterparty, to fulfill its payment obligations. Worsening regional and global economic conditions, segment or industry sector challenges, or company specific factors could result in defaults or downgrades and could lead to increased provisions or impairments related to the Company's general fund invested assets, derivative financial instruments and reinsurance assets and an increase in provisions for future credit impairments that are included in actuarial liabilities.

The Company's exposure to credit risk is managed through risk management policies and procedures which include a defined credit evaluation and adjudication process, delegated credit approval authorities and established exposure limits by borrower, corporate connection, credit rating, industry and geographic region. The Company measures 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.

The Company also ensures where warranted, that mortgages, private placements and loans to Bank clients are secured by collateral, the nature of which depends on the credit risk of the counterparty.

An allowance for losses on loans is established when a loan becomes impaired. Allowances for loan losses are calculated to reduce the carrying value of the loans to estimated net realizable value. The establishment of such allowances takes into consideration normal historical credit loss levels and future expectations, with an allowance for adverse deviations. In addition, policy liabilities include general provisions for credit losses from future asset impairments. Impairments are identified through regular monitoring of all credit related exposures, considering such information as general market conditions, industry and borrower specific credit events and any other relevant trends or conditions. Allowances for losses on reinsurance contracts are established when a reinsurance counterparty becomes unable or unwilling to fulfill its contractual obligations. The allowance for loss is based on current recoverable amounts and ceded policy liabilities.

Credit risk associated with derivative counterparties is discussed in note 9(f) and credit risk associated with reinsurance counterparties is discussed in note 9(k).

(i) Credit exposure

The following table presents the gross carrying amount of financial instruments subject to credit exposure, without considering any collateral held or other credit enhancements.

As at December 31,		2022		2021
Debt securities				
FVTPL	$	**170,273**	$	189,722
AFS		**32,220**		33,097
Other		**1,411**		1,320
Mortgages		**54,638**		52,014
Private placements		**47,057**		42,842
Policy loans		**6,894**		6,397
Loans to Bank clients		**2,781**		2,506
Derivative assets		**8,638**		17,650
Accrued investment income		**2,848**		2,676
Reinsurance assets		**47,712**		44,579
Other financial assets		**6,070**		6,240
Total	**$**	**380,542**	$	399,043

As at December 31, 2022, 96% (2021 – 97%) of debt securities were investment grade-rated with ratings ranging between AAA to BBB.

(ii) Credit quality

Credit quality of commercial mortgages and private placements

Credit quality of commercial mortgages and private placements is assessed at least annually by using an internal rating based on regular monitoring of credit-related exposures, considering both qualitative and quantitative factors.

A provision is recorded when the internal risk ratings indicate that a loss represents the most likely outcome. These assets are designated as non-accrual and an allowance is established based on an analysis of the security and repayment sources.

The following table presents the credit quality of commercial mortgages and private placements.

As at December 31, 2022	AAA	AA	A	BBB	BB	B and lower	Total
Commercial mortgages							
Retail	**$ 113**	**$ 1,526**	**$ 4,872**	**$ 2,055**	**$ 194**	**$ 2**	**$ 8,762**
Office	**102**	**1,460**	**5,950**	**1,471**	**57**	**33**	**9,073**
Multi-family residential	**500**	**2,213**	**3,751**	**892**	**11**	**-**	**7,367**
Industrial	**72**	**929**	**3,312**	**407**	**-**	**-**	**4,720**
Other	**180**	**990**	**798**	**764**	**-**	**-**	**2,732**
Total commercial mortgages	**967**	**7,118**	**18,683**	**5,589**	**262**	**35**	**32,654**
Agricultural mortgages	**-**	**-**	**119**	**240**	**-**	**-**	**359**
Private placements	**904**	**6,991**	**16,534**	**17,176**	**1,105**	**4,347**	**47,057**
Total	**$ 1,871**	**$ 14,109**	**$ 35,336**	**$ 23,005**	**$ 1,367**	**$ 4,382**	**$ 80,070**

As at December 31, 2021	AAA	AA	A	BBB	BB	B and lower	Total
Commercial mortgages							
Retail	$ 113	$ 1,340	$ 5,179	$ 1,936	$ 228	$ 2	$ 8,798
Office	56	1,256	6,004	1,291	87	40	8,734
Multi-family residential	557	1,869	3,771	767	32	-	6,996
Industrial	47	376	2,808	328	-	-	3,559
Other	212	1,010	787	956	47	-	3,012
Total commercial mortgages	985	5,851	18,549	5,278	394	42	31,099
Agricultural mortgages	-	-	119	242	-	-	361
Private placements	976	5,720	16,147	16,220	1,161	2,618	42,842
Total	$ 1,961	$ 11,571	$ 34,815	$ 21,740	$ 1,555	$ 2,660	$ 74,302

Credit quality of residential mortgages and loans to Bank clients

Credit quality of residential mortgages and loans to Bank clients is assessed at least annually with the loan being performing or non-performing as the key credit quality indicator.

Full or partial write-offs of loans are recorded when management believes that there is no realistic prospect of full recovery. Write-offs, net of recoveries, are deducted from the allowance for credit losses. All impairments are captured in the allowance for credit losses.

The following table presents credit quality of residential mortgages and loans to Bank clients.

	2022			2021		
As at December 31,	Insured	Uninsured	Total	Insured	Uninsured	Total
Residential mortgages						
Performing	**$ 7,015**	**$ 14,569**	**$ 21,584**	$ 7,264	$ 13,272	$ 20,536
Non-performing[(1)]	**8**	**33**	**41**	6	12	18
Loans to Bank clients						
Performing	**n/a**	**2,778**	**2,778**	n/a	2,506	2,506
Non-performing[(1)]	**n/a**	**3**	**3**	n/a	-	-
Total	**$ 7,023**	**$ 17,383**	**$ 24,406**	$ 7,270	$ 15,790	$ 23,060

[(1)] Non-performing refers to payments that are 90 days or more past due.

The carrying value of government-insured mortgages was 13% of the total mortgage portfolio as at December 31, 2022 (2021 – 14%). Most of these insured mortgages are residential loans as classified in the table above.

(iii) Past due or credit impaired financial assets

The Company provides for credit risk by establishing allowances against the carrying value of impaired loans and recognizing impairment losses on AFS debt securities. In addition, the Company reports as impairment losses certain declines in the fair value of debt securities designated as FVTPL which it deems represent impairments due to non-recoverability of due amounts.

The following table presents the carrying value of financial assets with some or all of their contractual payments past due but which are not impaired and impaired financial assets.

As at December 31, 2022	Past due but not impaired: Less than 90 days	90 days and greater	Total	Total impaired
Debt securities(1),(2)				
FVTPL	**$ 2,059**	**$ 71**	**$ 2,130**	**$ 9**
AFS	**922**	**-**	**922**	**-**
Private placements(1)	**317**	**152**	**469**	**229**
Mortgages and loans to Bank clients	**103**	**-**	**103**	**74**
Other financial assets	**36**	**34**	**70**	**1**
Total	**$ 3,437**	**$ 257**	**$ 3,694**	**$ 313**

As at December 31, 2021	Past due but not impaired: Less than 90 days	90 days and greater	Total	Total impaired
Debt securities(1),(2)				
FVTPL	$ 20	$ -	$ 20	$ 2
AFS	-	-	-	-
Private placements(1)	63	-	63	175
Mortgages and loans to Bank clients	61	-	61	51
Other financial assets	261	47	308	-
Total	$ 405	$ 47	$ 452	$ 228

(1) Payments of $12 on $3,297 (December 31, 2021 – $nil and $20, respectively) of financial assets past due less than 90 days are delayed.
(2) Payments of $4 on $224 (December 31, 2021 – $nil and $nil, respectively) of financial assets past due greater than 90 days are delayed.

The following table presents gross carrying value and allowances for loan losses for impaired loans.

As at December 31, 2022	Gross carrying value	Allowances for loan losses	Net carrying value
Private placements	**$ 254**	**$ 25**	**$ 229**
Mortgages and loans to Bank clients	**96**	**22**	**74**
Total	**$ 350**	**$ 47**	**$ 303**

As at December 31, 2021	Gross carrying value	Allowances for loan losses	Net carrying value
Private placements	$ 197	$ 22	$ 175
Mortgages and loans to Bank clients	73	22	51
Total	$ 270	$ 44	$ 226

The following table presents movement of allowance for loan losses during the year.

	2022			2021		
For the years ended December 31,	Private placements	Mortgages and loans to Bank clients	Total	Private placements	Mortgages and loans to Bank clients	Total
Balance, January 1	**$ 22**	**$ 22**	**$ 44**	$ 79	$ 28	$ 107
Provisions	**22**	**4**	**26**	14	12	26
Recoveries	**(18)**	**(2)**	**(20)**	(58)	(16)	(74)
Write-offs(1)	**(1)**	**(2)**	**(3)**	(13)	(2)	(15)
Balance, December 31	**$ 25**	**$ 22**	**$ 47**	$ 22	$ 22	$ 44

(1) Includes disposals and impact of changes in foreign exchange rates.

(d) Securities lending, repurchase and reverse repurchase transactions

The Company engages in securities lending to generate fee income. Collateral exceeding the market value of the loaned securities is retained by the Company until the underlying security has been returned to the Company. The market value of the loaned securities is monitored daily and additional collateral is obtained or refunded as the market value of the underlying loaned securities fluctuates. As at December 31, 2022, the Company had loaned securities (which are included in invested assets) with a market value of $723 (2021 – $564). The Company holds collateral with a current market value that exceeds the value of securities lent in all cases.

The Company engages in reverse repurchase transactions to generate fee income to take possession of securities to cover short positions in similar instruments and to meet short-term funding requirements. As at December 31, 2022, the Company had engaged in reverse repurchase transactions of $895 (2021 – $1,490) which are recorded as short-term receivables. In addition, the Company had engaged in repurchase transactions of $895 as at December 31, 2022 (2021 – $536) which are recorded as payables.

(e) Credit default swaps

The Company replicates exposure to specific issuers by selling credit protection via credit default swaps ("CDS") to complement its cash debt securities investing. The Company does not write CDS protection more than its government bond holdings. A CDS is a derivative instrument representing an agreement between two parties to exchange the credit risk of a single specified entity or an index based on the credit risk of a group of entities (all commonly referred to as the "reference entity" or a portfolio of "reference entities"), in return for a periodic premium. CDS contracts typically have a five-year term.

The following table presents details of the credit default swap protection sold by type of contract and external agency rating for the underlying reference security.

As at December 31, 2022		Notional amount(1)		Fair value	Weighted average maturity (in years)(2)
Single name CDS(3) – Corporate debt					
A	**$**	**133**	**$**	**4**	**4**
BBB		**26**		**-**	**1**
Total single name CDS	**$**	**159**	**$**	**4**	**4**
Total CDS protection sold	**$**	**159**	**$**	**4**	**4**

As at December 31, 2021		Notional amount(1)		Fair value	Weighted average maturity (in years)(2)
Single name CDS(3) – Corporate debt					
A	$	16	$	-	1
BBB		28		1	2
Total single name CDS	$	44	$	1	2
Total CDS protection sold	$	44	$	1	2

(1) Notional amounts represent the maximum future payments the Company would have to pay its CDS counterparties assuming a default of the underlying credit and zero recovery on the underlying issuer obligations.

(2) The weighted average maturity of the CDS is weighted based on notional amounts.

(3) Ratings are based on S&P where available followed by Moody's, DBRS, and Fitch. If no rating is available from a rating agency, an internally developed rating is used.

The Company held no purchased credit protection as at December 31, 2022 and 2021.

(f) Derivatives

The Company's point-in-time exposure to losses related to credit risk of a derivative counterparty is limited to the amount of any net gains that may have accrued with the particular counterparty. Gross derivative counterparty exposure is measured as the total fair value (including accrued interest) of all outstanding contracts in a gain position excluding any offsetting contracts in a loss position and the impact of collateral on hand. The Company limits the risk of credit losses from derivative counterparties by using investment grade counterparties, entering into master netting arrangements which permit the offsetting of contracts in a loss position in the case of a counterparty default and entering into Credit Support Annex agreements whereby collateral must be provided when the exposure exceeds a certain threshold. All contracts are held with or guaranteed by investment grade counterparties, the majority of whom are rated A- or higher. As at December 31, 2022, the percentage of the Company's derivative exposure with counterparties rated AA- or higher was 36 per cent (2021 – 17 per cent). The Company's exposure to credit risk was mitigated by $2,194 fair value of collateral held as security as at December 31, 2022 (2021 – $10,121).

As at December 31, 2022, the largest single counterparty exposure, without taking into consideration the impact of master netting agreements or the benefit of collateral held, was $1,582 (2021 – $2,132). The net exposure to this counterparty, after taking into consideration master netting agreements and the fair value of collateral held, was $nil (2021 – $nil). As at December 31, 2022, the total maximum credit exposure related to derivatives across all counterparties, without taking into consideration the impact of master netting agreements and the benefit of collateral held, was $9,123 (2021 – $18,373).

(g) Offsetting financial assets and financial liabilities

Certain derivatives, securities lent and repurchase agreements have conditional offset rights. The Company does not offset these financial instruments in the Consolidated Statements of Financial Position, as the rights of offset are conditional.

In the case of derivatives, collateral is collected from and pledged to counterparties and clearing houses to manage credit risk exposure in accordance with Credit Support Annexes to swap agreements and clearing agreements. Under master netting agreements, the Company has a right of offset in the event of default, insolvency, bankruptcy or other early termination.

In the case of reverse repurchase and repurchase transactions, additional collateral may be collected from or pledged to counterparties to manage credit exposure according to bilateral reverse repurchase or repurchase agreements. In the event of default by a reverse purchase transaction counterparty, the Company is entitled to liquidate the collateral held to offset against the same counterparty's obligation.

The following table presents the effect of conditional master netting and similar arrangements. Similar arrangements may include global master repurchase agreements, global master securities lending agreements, and any related rights to financial collateral pledged or received.

		Related amounts not set off in the Consolidated Statements of Financial Position			
As at December 31, 2022	Gross amounts of financial instruments[1]	Amounts subject to an enforceable master netting arrangement or similar agreements	Financial and cash collateral pledged (received)[2]	Net amount including financing entity[3]	Net amounts excluding financing entity
Financial assets					
Derivative assets	**$ 9,123**	**$ (7,221)**	**$ (1,687)**	**$ 215**	**$ 215**
Securities lending	**723**	**-**	**(723)**	**-**	**-**
Reverse repurchase agreements	**895**	**(779)**	**(116)**	**-**	**-**
Total financial assets	**$ 10,741**	**$ (8,000)**	**$ (2,526)**	**$ 215**	**$ 215**
Financial liabilities					
Derivative liabilities	**$ (15,230)**	**$ 7,221**	**$ 7,834**	**$ (175)**	**$ (103)**
Repurchase agreements	**(895)**	**779**	**116**	**-**	**-**
Total financial liabilities	**$ (16,125)**	**$ 8,000**	**$ 7,950**	**$ (175)**	**$ (103)**

		Related amounts not set off in the Consolidated Statements of Financial Position			
As at December 31, 2021	Gross amounts of financial instruments[1]	Amounts subject to an enforceable master netting arrangement or similar agreements	Financial and cash collateral pledged (received)[2]	Net amount including financing entity[3]	Net amounts excluding financing entity
Financial assets					
Derivative assets	$ 18,373	$ (8,444)	$ (9,522)	$ 407	$ 294
Securities lending	564	-	(564)	-	-
Reverse repurchase agreements	1,490	(183)	(1,307)	-	-
Total financial assets	$ 20,427	$ (8,627)	$ (11,393)	$ 407	$ 294
Financial liabilities					
Derivative liabilities	$ (10,974)	$ 8,444	$ 2,250	$ (280)	$ (79)
Repurchase agreements	(536)	183	353	-	-
Total financial liabilities	$ (11,510)	$ 8,627	$ 2,603	$ (280)	$ (79)

(1) Financial assets and liabilities include accrued interest of $489 and $864, respectively (2021 – $725 and $901, respectively).

(2) Financial and cash collateral exclude over-collateralization. As at December 31, 2022, the Company was over-collateralized on OTC derivative assets, OTC derivative liabilities, securities lending and reverse repurchase agreements and repurchase agreements in the amounts of $507, $1,528, $63 and $nil, respectively (2021 – $599, $875, $36 and $2, respectively). As at December 31, 2022, collateral pledged (received) does not include collateral-in-transit on OTC instruments or initial margin on

exchange traded contracts or cleared contracts.

(3) Includes derivative contracts entered between the Company and its financing entity which it does not consolidate. The Company does not exchange collateral on derivative contracts entered with this entity. Refer to note 17.

The Company also has certain credit linked note assets and variable surplus note liabilities which have unconditional offsetting rights. Under the netting agreements, the Company has rights of offset including in the event of the Company's default, insolvency, or bankruptcy. These financial instruments are offset in the Consolidated Statements of Financial Position.

A credit linked note is a fixed income instrument the term of which, in this case, is linked to a variable surplus note. A surplus note is a subordinated debt obligation that often qualifies as surplus (the U.S. statutory equivalent of equity) by some U.S. state insurance regulators. Interest payments on surplus notes are made after all other contractual payments are made. The following table presents the effect of unconditional netting.

As at December 31, 2022	Gross amounts of financial instruments	Amounts subject to an enforceable netting arrangement	Net amounts of financial instruments
Credit linked note[1]	**$ 1,242**	**$ (1,242)**	**$ -**
Variable surplus note	**(1,242)**	**1,242**	**-**
As at December 31, 2021	Gross amounts of financial instruments	Amounts subject to an enforceable netting arrangement	Net amounts of financial instruments
Credit linked note[1]	$ 1,054	$ (1,054)	$ -
Variable surplus note	(1,054)	1,054	-

(1) As at December 31, 2022 and 2021, the Company had no fixed surplus notes outstanding, refer to note 18(g).

(h) Risk concentrations

The Company defines enterprise-wide investment portfolio level targets and limits to ensure that portfolios are diversified across asset classes and individual investment risks. The Company monitors actual investment positions and risk exposures for concentration risk and reports its findings to the Executive Risk Committee and the Risk Committee of the Board of Directors.

As at December 31,	**2022**	2021
Debt securities and private placements rated as investment grade BBB or higher[1]	**96%**	97%
Government debt securities as a per cent of total debt securities	**36%**	36%
Government private placements as a per cent of total private placements	**10%**	11%
Highest exposure to a single non-government debt security and private placement issuer	**$ 1,006**	$ 1,167
Largest single issuer as a per cent of the total equity portfolio	**2%**	2%
Income producing commercial office properties (2022 – 41% of real estate, 2021 – 47%)	**$ 5,486**	$ 6,244
Largest concentration of mortgages and real estate[2] – Ontario, Canada (2022 – 27%, 2021 – 28%)	**$ 18,343**	$ 18,253

(1) Investment grade debt securities and private placements include 39% rated A, 17% rated AA and 14% rated AAA (2021 – 39%, 17% and 15%) investments based on external ratings where available.

(2) Mortgages and real estate investments are diversified geographically and by property type.

The following table presents debt securities and private placements portfolio by sector and industry.

As at December 31,	2022 Carrying value	2022 % of total	2021 Carrying value	2021 % of total
Government and agency	**$ 77,236**	**31**	$ 84,244	32
Utilities	**46,315**	**18**	48,372	18
Financial	**38,808**	**15**	38,905	15
Consumer	**31,556**	**13**	32,671	12
Energy	**16,314**	**7**	19,637	7
Industrial	**23,823**	**9**	24,727	9
Other	**16,909**	**7**	18,425	7
Total	**$ 250,961**	**100**	$ 266,981	100

(i) Insurance risk

Insurance risk is the risk of loss due to actual experience for mortality and morbidity claims, policyholder behaviour and expenses emerging differently than assumed when a product was designed and priced. A variety of assumptions are made related to these experience factors, for reinsurance costs, and for sales levels when products are designed and priced, as well as in the determination of 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. Such assumptions require significant professional judgment, and actual experience may be materially different than the assumptions made by the Company. 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 man-made disasters and acts of terrorism. 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. Some reinsurance rates are not guaranteed and may be changed unexpectedly. Adjustments the Company seeks to make to Non-Guaranteed elements to reflect changing experience factors may be challenged by regulatory or legal action and the Company may be unable to implement them or may face delays in implementation.

The Company manages insurance risk through global policies, standards and best practices with respect to product design, pricing, underwriting and claim adjudication, and a global underwriting manual. Each business unit establishes underwriting policies and procedures, including criteria for approval of risks and claims adjudication policies and procedures. The current global life retention limit is US$30 for individual policies (US$35 for survivorship life policies) and is shared across businesses. Lower limits are applied in some markets and jurisdictions. The Company aims to further reduce exposure to claims concentrations by applying geographical aggregate retention limits for certain covers. Enterprise-wide, the Company aims to reduce the likelihood of high aggregate claims by operating globally, insuring a wide range of unrelated risk events, and reinsuring some risk.

(j) Concentration risk

The geographic concentration of the Company's insurance and investment contract liabilities, including embedded derivatives, is shown below. The disclosure is based on the countries in which the business is written.

As at December 31, 2022	Gross liabilities	Reinsurance assets	Net liabilities
U.S. and Canada	**$ 251,305**	**$ (45,898)**	**$ 205,407**
Asia and Other	**123,808**	**(1,814)**	**121,994**
Total	**$ 375,113**	**$ (47,712)**	**$ 327,401**

As at December 31, 2021	Gross liabilities	Reinsurance assets	Net liabilities
U.S. and Canada	$ 271,090	$ (42,806)	$ 228,284
Asia and Other	124,398	(1,773)	122,625
Total	$ 395,488	$ (44,579)	$ 350,909

(k) Reinsurance risk

In the normal course of business, the Company limits the amount of loss on any one policy by reinsuring certain levels of risk with other insurers. In addition, the Company accepts reinsurance from other reinsurers. Reinsurance ceded does not discharge the Company's liability as the primary insurer. Failure of reinsurers to honour their obligations could result in losses to the Company; consequently, allowances are established for amounts deemed uncollectible. To minimize losses from reinsurer insolvency, the Company monitors the concentration of credit risk both geographically and with any one reinsurer. In addition, the Company selects reinsurers with high credit ratings.

As at December 31, 2022, the Company had $47,712 (2021 – $44,579) of reinsurance assets. Of this, 91 per cent (2021 – 94 per cent) were ceded to reinsurers with Standard and Poor's ratings of A- or above. The Company's exposure to credit risk was mitigated by $25,247 fair value of collateral held as security as at December 31, 2022 (2021 – $25,466). Net exposure after considering offsetting agreements and the benefit of the fair value of collateral held was $22,465 as at December 31, 2022 (2021 – $19,113).

Note 10 Capital Instruments

(a) Carrying value of capital instruments

As at December 31,	Issuance date	Earliest par redemption date	Maturity date	Par value	**2022**	2021
JHFC Subordinated notes[(1),(2)]	December 14, 2006	n/a	December 15, 2036	$650	**$ 647**	$ 647
3.181% MLI Subordinated debentures[(1),(3)]	November 20, 2015	November 22, 2022	November 22, 2027	$1,000	**-**	999
7.375% JHUSA Surplus notes[(4)]	February 25, 1994	n/a	February 15, 2024	US$450	**615**	579
Total					**$ 1,262**	$ 2,225

(1) The Company is monitoring regulatory and market developments globally with respect to the interest rate benchmark reform. As reference interest rates for these capital instruments could potentially be discontinued in the future, the Company will take appropriate actions in due course to accomplish the necessary transitions or replacements. As at December 31, 2022, capital instruments of $647 (2021 – $647) have interest rate referencing CDOR.

(2) Issued by Manulife Holdings (Delaware) LLC ("MHDLL"), now John Hancock Financial Corporation ("JHFC"), a wholly owned subsidiary of MFC, to Manulife Finance (Delaware) LLC ("MFLLC"), a subsidiary of Manulife Finance (Delaware) L.P. ("MFLP"). MFLP and its subsidiaries are wholly owned unconsolidated related parties of MFC and are related parties of the Company. The notes bear interest at a floating rate equal to the 90-day Bankers' Acceptance rate plus 0.72%. With regulatory approval, JHFC may redeem the note, in whole or in part, at any time, at par, together with accrued and unpaid interest. Refer to note 17(b). This subordinated debenture is included in related party capital instruments (refer to note 20(b)).

(3) MLI redeemed in full the 3.181% MLI subordinated debentures at par, on November 22, 2022, the earliest par redemption date.

(4) Issued by John Hancock Mutual Life Insurance Company, now John Hancock Life Insurance Company (U.S.A.). Any payment of interest or principal on the surplus notes requires prior approval from the Department of Insurance and Financial Services of the State of Michigan. The carrying value of the surplus notes reflects an unamortized fair value increment of US$5 (2021 – US$9), which arose as a result of the acquisition of John Hancock Financial Services, Inc. The amortization of the fair value adjustment is recorded in interest expense.

(b) Fair value measurement

Fair value of capital instruments is determined using the following hierarchy:

Level 1 – Fair value is determined using quoted market prices where available.

Level 2 – When quoted market prices are not available, fair value is determined with reference to quoted prices of similar debt instruments or estimated using discounted cash flows based on observable market rates.

The Company measures capital instruments at amortized cost in the Consolidated Statements of Financial Position. As at December 31, 2022, the fair value of capital instruments was $1,243 (2021 – $2,306). Fair value of capital instruments was determined using Level 2 valuation techniques (2021 – Level 2).

Note 11 Share Capital

The authorized capital of MLI consists of:

- an unlimited number of common shares without nominal or par value; and
- an unlimited number of Class A, Class B and Class 1 preferred shares without nominal or par value, issuable in series.

	2022			2021		
As at December 31,	Number of shares		Amount	Number of shares		Amount
Common shares	**5,638,986,470**	**$**	**43,592**	5,638,986,467	$	41,630

During 2022, MLI issued 2 common shares to MFC in exchange for $1,962 and 1 common share to MFC in connection with the acquisition of the shares of certain MFC subsidiaries.

During 2021, MLI issued 2 common shares to MFC in exchange for $3,200 and 1 common share to MFC in connection with the acquisition of the shares of certain MFC subsidiaries.

Note 12 Capital Management

(a) Capital management

The Company monitors and manages its consolidated capital in compliance with the Life Insurance Capital Adequacy Test ("LICAT") guideline, the capital framework issued by the Office of the Superintendent of Financial Institutions (“OSFI”). Under the capital framework, the Company’s consolidated capital resources, including available capital, surplus allowance, and eligible deposits, are measured against the base solvency buffer, which is the risk-based capital requirement determined in accordance with the guideline.

The Company 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 shareholder 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.

The capital management framework considers the requirements of the Company as a whole as well as the needs of each of the Company’s subsidiaries. Internal capital targets are set above the regulatory requirements, and consider a number of factors, including expectations of regulators and rating agencies, results of sensitivity and stress testing and the Company’s own risk assessments. The Company monitors against these internal targets and initiates actions appropriate to achieving its business objectives.

Consolidated capital, based on accounting standards, is presented in the table below. For regulatory reporting purposes, under the LICAT framework, the numbers are further adjusted for various additions or deductions to capital as mandated by the guidelines used by OSFI.

Consolidated capital

As at December 31,		2022		2021
Total equity	**$**	**67,511**	$	69,068
Exclude AOCI gain/(loss) on cash flow hedges		**(72)**		(245)
Total equity excluding AOCI on cash flow hedges		**67,583**		69,313
Qualifying capital instruments		**1,262**		2,225
Consolidated capital	**$**	**68,845**	$	71,538

(b) Restrictions on dividends and capital distributions

Dividends and capital distributions are restricted under the Insurance Companies Act ("ICA"). The ICA prohibits the declaration or payment of any dividend on shares of an insurance company if there are reasonable grounds for believing a company does not have adequate capital and adequate and appropriate forms of liquidity or 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 OSFI. The ICA also requires an insurance company to notify OSFI of the declaration of a dividend at least 15 days prior to the date fixed for its payment. Similarly, the ICA prohibits the purchase for cancellation of any shares issued by an insurance company or the redemption of any redeemable shares or other similar capital transactions, if there are reasonable grounds for believing that the company does not have adequate capital and adequate and appropriate forms of liquidity or the payment 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 any direction made to the company by OSFI. These latter transactions would require the prior approval of OSFI.

The ICA requires Canadian insurance companies to maintain adequate levels of capital at all times.

MLI's ability to pay future dividends will depend in part on the receipt of sufficient funds from its regulated insurance subsidiaries. These subsidiaries are also subject to certain regulatory restrictions under laws in Canada, the United States and certain other countries that may limit their ability to pay dividends or make other upstream distributions.

Note 13 Revenue from Service Contracts

The Company provides investment management services, transaction processing and administrative services and distribution and related services to proprietary and third-party investment funds, retirement plans, group benefit plans, institutional investors and other arrangements. The Company also provides real estate management services to tenants of the Company's investment properties.

The Company's service contracts generally impose single performance obligations, each consisting of a series of similar related services for each customer.

The Company's performance obligations within service arrangements are generally satisfied over time as the customer simultaneously receives and consumes the benefits of the services rendered, measured using an output method. Fees typically include variable consideration and the related revenue is recognized to the extent that it is highly probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty is subsequently resolved.

Asset based fees vary with asset values of accounts under management, subject to market conditions and investor behaviors beyond the Company's control. Transaction processing and administrative fees vary with activity volume, also beyond the Company's control. Some fees, including distribution fees, are based on account balances and transaction volumes. Fees related to account balances and transaction volumes are measured daily. Real estate management service fees include fixed portions plus recovery of variable costs of services rendered to tenants. Fees related to services provided are generally recognized as services are rendered, which is when it becomes highly probable that no significant reversal of cumulative revenue recognized will occur. The Company has determined that its service contracts have no significant financing components because fees are collected monthly. The Company has no significant contract assets or contract liabilities.

The following tables present revenue from service contracts by service lines and reporting segments as disclosed in note 19.

For the year ended December 31, 2022	Asia	Canada	U.S.	Global WAM	Corporate and Other	Total
Investment management and other related fees	**$ 234**	**$ 242**	**$ 445**	**$ 3,079**	**$ (250)**	**$ 3,750**
Transaction processing, administration, and service fees	**292**	**866**	**13**	**2,416**	**(8)**	**3,579**
Distribution fees and other	**143**	**43**	**76**	**868**	**(44)**	**1,086**
Total included in other revenue	**669**	**1,151**	**534**	**6,363**	**(302)**	**8,415**
Revenue from non-service lines	**789**	**275**	**(76)**	**(13)**	**(187)**	**788**
Total other revenue	**$ 1,458**	**$ 1,426**	**$ 458**	**$ 6,350**	**$ (489)**	**$ 9,203**
Real estate management services included in net investment income	**$ 35**	**$ 136**	**$ 126**	**$ -**	**$ 8**	**$ 305**

For the year ended December 31, 2021	Asia	Canada	U.S.	Global WAM	Corporate and Other	Total
Investment management and other related fees	$ 217	$ 230	$ 499	$ 3,198	$ (247)	$ 3,897
Transaction processing, administration, and service fees	287	918	12	2,517	(11)	3,723
Distribution fees and other	251	20	65	799	(54)	1,081
Total included in other revenue	755	1,168	576	6,514	(312)	8,701
Revenue from non-service lines	941	168	1,248	(1)	46	2,402
Total other revenue	$ 1,696	$ 1,336	$ 1,824	$ 6,513	$ (266)	$ 11,103
Real estate management services included in net investment income	$ 37	$ 126	$ 128	$ -	$ 7	$ 298

Note 14 Stock-Based Compensation

Selected individuals employed by the Company are granted MFC stock options under MFC's Executive Stock Option Plan ("ESOP"). The options provide the holder the right to purchase MFC common shares at an exercise price equal to the higher of the prior day, prior five-day or prior ten-day average closing market price of MFC common shares on the Toronto Stock Exchange on the date the options are granted. The options vest over a period not exceeding four years and expire not more than 10 years from the grant date. Effective with the 2015 grant, options may only be exercised after the fifth-year anniversary.

For the year ended December 31, 2022, 8.6 million Restricted Share Units ("RSUs") (2021 – 6.8 million) and 1.7 million Performance Share Units ("PSUs") (2021 – 1.5 million) were granted to certain eligible employees under MFC's Restricted Share Unit Plan. The fair value of the RSUs and PSUs granted during the year was $24.15 per unit as at December 31, 2022 (2021 – $24.11 per unit). Each RSU and PSU entitles the holder to receive payment equal to the market value of one common share of MFC, plus credited dividends, at the time of vesting, subject to any performance conditions.

RSUs and PSUs granted in March 2022 will vest after 36 months from their grant date and the related compensation expense is recognized over this period, unless the employee is eligible to retire at the time of grant or will be eligible to retire during the vesting period, in which case the cost is recognized at the grant date or over the period between the grant date and the date on which the employee is eligible to retire, respectively. Compensation expense related to RSUs and PSUs was $158 and $23, respectively, for the year ended December 31, 2022 (2021 – $135 and $31, respectively).

In aggregate, the Company recorded stock-based compensation expense of $186 for the year ended December 31, 2022 (2021 – $178).

The Company's Global Share Ownership Plan allows qualifying employees to apply up to five per cent of their annual base earnings toward the purchase of MFC common shares. The Company matches a percentage of the employee's eligible contributions up to a maximum amount. The Company's contributions vest immediately. All contributions are used to purchase MFC common shares in the open market on behalf of participating employees.

Note 15 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.

(a) Plan characteristics

The Company's final average pay defined benefit pension plans and retiree welfare plans are closed to new members. All employees may participate in capital accumulation plans including defined benefit cash balance plans, 401(k) plans and/or defined contribution plans, depending on the country of employment.

All pension arrangements are governed by local pension committees or management, but significant plan changes require approval from the Company's Board of Directors.

The Company's funding policy for defined benefit pension plans is to make the minimum annual contributions required by regulations in the countries in which the plans are offered. Assumptions and methods prescribed for regulatory funding purposes typically differ from those used for accounting purposes.

The Company's remaining defined benefit pension and/or retiree welfare plans are in the U.S., Canada, Japan and Taiwan (China). There are also disability welfare plans in the U.S. and Canada.

The largest defined benefit pension and retiree welfare plans are the primary plans for employees in the U.S. and Canada. These are the material plans that are discussed in the balance of this note. The Company measures its defined benefit obligations and fair value of plan assets for accounting purposes as at December 31 each year.

U.S. defined benefit pension and retiree welfare plans

The Company operates a qualified cash balance plan that is open to new members, a closed non-qualified cash balance plan, and a closed retiree welfare plan.

Actuarial valuations to determine the Company's minimum funding contributions for the qualified cash balance plan are required annually. Deficits revealed in the funding valuations must generally be funded over a period of up to seven years. It is expected that there will be no required funding for this plan in 2023. There are no plan assets set aside for the non-qualified cash balance plan.

The retiree welfare plan subsidizes the cost of life insurance and medical benefits. The majority of those who retired after 1991 receive a fixed-dollar subsidy from the Company based on service. The plan was closed to all employees hired after 2004. While assets have been set aside in a qualified trust to pay future retiree welfare benefits, this funding is optional. Retiree welfare benefits offered under the plan coordinate with the U.S. Medicare program to make optimal use of available federal financial support.

The qualified pension and retiree welfare plans are governed by the U.S. Benefits Committee, while the non-qualified pension plan is governed by the U.S. Non-Qualified Plans Subcommittee.

Canadian defined benefit pension and retiree welfare plans

The Company's defined benefit plans in Canada include two registered final average pay pension plans, a non-registered supplemental final average pay pension plan and a retiree welfare plan, all of which have been closed to new members.

Actuarial valuations to determine the Company's minimum funding contributions for the registered pension plans are required at least once every three years. Deficits revealed in the funding valuation must generally be funded over a period of ten years. For 2023, the required funding for these plans is expected to be $3. The non-registered supplemental pension plan is not funded.

The retiree welfare plan subsidizes the cost of life insurance, medical and dental benefits. These subsidies are a fixed-dollar amount for those who retired after April 30, 2013 and have been eliminated for those who retire after 2019. There are no assets set aside for this plan.

The registered pension plans are governed by Pension Committees, while the supplemental non-registered plan is governed by the Board of Directors. The retiree welfare plan is governed by management.

(b) Risks

In final average pay pension plans and retiree welfare plans, the Company generally bears the material risks which include interest rate, investment, longevity and health care cost inflation risks. In defined contribution plans, these risks are typically borne by the employee. In cash balance plans, the interest rate, investment and longevity risks are partially transferred to the employee.

Material sources of risk to the Company for all plans include:

- A decline in discount rates that increases the defined benefit obligations by more than the change in value of plan assets;
- Lower than expected rates of mortality; and
- For retiree welfare plans, higher than expected health care costs.

The Company has managed these risks through plan design and eligibility changes that have limited the size and growth of the defined benefit obligations. Investment risks for funded plans are managed by investing significantly in asset classes which are highly correlated with the plans' liabilities.

In the U.S., delegated committee representatives and management review the financial status of the qualified defined benefit pension plan at least monthly, and steps are taken in accordance with an established dynamic investment policy to increase the plan's allocation to asset classes which are highly correlated with the plan's liabilities and reduce investment risk as the funded status improves. As at December 31, 2022, the target asset allocation for the plan was 30% return-seeking assets and 70% liability-hedging assets (2021 – 30% and 70%).

In Canada, internal committees and management review the financial status of the registered defined benefit pension plans on at least a quarterly basis. As at December 31, 2022, the target asset allocation for the plans was 20% return-seeking assets and 80% liability-hedging assets (2021 – 20% and 80%).

Certain long-term impacts of the COVID-19 pandemic (on future mortality and inflation, for example) are still unknown. The Company will continue to closely monitor experience related to COVID-19, as well as emerging research, and will adjust its long-term assumptions accordingly in the future.

(c) Pension and retiree welfare plans

The following tables present the reconciliation of defined benefit obligation and fair value of plan assets for the pension plans and retiree welfare plans.

	Pension plans		Retiree welfare plans	
For the years ended December 31,	**2022**	2021	**2022**	2021
Changes in defined benefit obligation:				
Opening balance	**$ 4,560**	$ 4,901	**$ 584**	$ 638
Current service cost	**43**	44	**-**	-
Past service cost - amendment	**(6)**	-	**-**	-
Interest cost	**127**	115	**16**	15
Plan participants' contributions	**-**	-	**3**	3
Actuarial losses (gains) due to:				
Experience	**5**	3	**(13)**	-
Demographic assumption changes	**-**	7	**-**	1
Economic assumption changes	**(835)**	(194)	**(112)**	(29)
Benefits paid	**(299)**	(303)	**(40)**	(42)
Impact of changes in foreign exchange rates	**199**	(13)	**28**	(2)
Defined benefit obligation, December 31	**$ 3,794**	$ 4,560	**$ 466**	$ 584

For the years ended December 31,	Pension plans				Retiree welfare plans			
		2022		2021		2022		2021
Change in plan assets:								
Fair value of plan assets, opening balance	**$**	**4,510**	$	4,595	**$**	**587**	$	606
Interest income		**127**		109		**16**		14
Return on plan assets (excluding interest income)		**(869)**		70		**(91)**		(1)
Employer contributions		**59**		61		**11**		11
Plan participants' contributions		**-**		-		**3**		3
Benefits paid		**(299)**		(303)		**(40)**		(42)
Administration costs		**(11)**		(9)		**(2)**		(2)
Impact of changes in foreign exchange rates		**205**		(13)		**39**		(2)
Fair value of plan assets, December 31	**$**	**3,722**	$	4,510	**$**	**523**	$	587

(d) Amounts recognized in the Consolidated Statements of Financial Position

The following table presents the deficit (surplus) and net defined benefit liability (asset) for the pension plans and retiree welfare plans.

As at December 31,	Pension plans				Retiree welfare plans			
		2022		2021		2022		2021
Development of net defined benefit liability								
Defined benefit obligation	**$**	**3,794**	$	4,560	**$**	**466**	$	584
Fair value of plan assets		**3,722**		4,510		**523**		587
Deficit (surplus)		**72**		50		**(57)**		(3)
Effect of asset limit[1]		**48**		37		**-**		-
Deficit (surplus) and net defined benefit liability (asset)		**120**		87		**(57)**		(3)
Deficit is comprised of:								
Funded or partially funded plans		**(441)**		(600)		**(168)**		(154)
Unfunded plans		**561**		687		**111**		151
Deficit (surplus) and net defined benefit liability (asset)	**$**	**120**	$	87	**$**	**(57)**	$	(3)

[1] The asset limit relates to a registered pension plan in Canada. The surplus in that plan is above the present value of economic benefits that can be derived by the Company through reductions in future contributions. For the other funded pension plans, the present value of the economic benefits available in the form of reductions in future contributions to the plans remains greater than the current surplus.

(e) Disaggregation of defined benefit obligation

The following table presents components of the defined benefit obligation between active members and inactive and retired members.

	U.S. plans								**Canadian plans**							
	Pension plans				Retiree welfare plans				Pension plans				Retiree welfare plans			
As at December 31,		**2022**		2021		**2022**		2021		**2022**		2021		**2022**		2021
Active members	**$**	**509**	$	537	**$**	**11**	$	17	**$**	**125**	$	184	**$**	**-**	$	-
Inactive and retired members		**2,006**		2,371		**344**		416		**1,154**		1,468		**111**		151
Total	**$**	**2,515**	$	2,908	**$**	**355**	$	433	**$**	**1,279**	$	1,652	**$**	**111**	$	151

(f) Fair value measurements

The following tables present major categories of plan assets and the allocation to each category.

	U.S. plans(1)				Canadian plans(2)			
	Pension plans		Retiree welfare plans		Pension plans		Retiree welfare plans	
As at December 31, 2022	Fair value	% of total	Fair value	% of total	Fair value	% of total	Fair value	% of total
Cash and cash equivalents	**$ 35**	**1%**	**$ 22**	**4%**	**$ 9**	**1%**	**$ -**	**-**
Public equity securities(3)	**377**	**15%**	**41**	**8%**	**233**	**20%**	**-**	**-**
Public debt securities	**1,509**	**58%**	**445**	**85%**	**898**	**79%**	**-**	**-**
Other investments(4)	**660**	**26%**	**15**	**3%**	**1**	**0%**	**-**	**-**
Total	**$ 2,581**	**100%**	**$ 523**	**100%**	**$ 1,141**	**100%**	**$ -**	**-**

	U.S. plans(1)				Canadian plans(2)			
	Pension plans		Retiree welfare plans		Pension plans		Retiree welfare plans	
As at December 31, 2021	Fair value	% of total	Fair value	% of total	Fair value	% of total	Fair value	% of total
Cash and cash equivalents	$ 90	3%	$ 21	4%	$ 14	1%	$ -	-
Public equity securities(3)	600	20%	57	10%	322	22%	-	-
Public debt securities	1,863	61%	501	85%	1,144	77%	-	-
Other investments(4)	475	16%	8	1%	2	0%	-	-
Total	$ 3,028	100%	$ 587	100%	$ 1,482	100%	$ -	-

(1) The U.S. pension and retiree welfare plan assets have daily quoted prices in active markets, except for the private debt, infrastructure, private equity, real estate, timber and agriculture assets. In the aggregate, the latter assets represent approximately 15% of all U.S. pension and retiree welfare plan assets as at December 31, 2022 (2021 – 7%).

(2) All the Canadian pension plan assets have daily quoted prices in active markets, except for the group annuity contract assets that represent approximately 0.1% of all Canadian pension plan assets as at December 31, 2022 (2021 – 0.1%).

(3) Equity securities include direct investments in MFC common shares of $1.2 (2021 – $1.2) in the U.S. retiree welfare plan and $nil (2021 – $nil) in Canada.

(4) Other U.S. plan assets include investment in real estate, private debt, infrastructure, private equity, timberland and agriculture, and managed futures. Other Canadian pension plan assets include investment in the group annuity contract.

(g) Net benefit cost recognized in the Consolidated Statements of Income

The following table presents components of the net benefit cost for the pension plans and retiree welfare plans.

	Pension plans		Retiree welfare plans	
For the years ended December 31,	**2022**	2021	**2022**	2021
Defined benefit current service cost(1)	**$ 43**	$ 44	**$ -**	$ -
Defined benefit administrative expenses	**11**	9	**2**	2
Past service cost - plan amendments and curtailments	**(6)**	-	**-**	-
Service cost	**48**	53	**2**	2
Interest on net defined benefit (asset) liability	**2**	6	**-**	1
Defined benefit cost	**50**	59	**2**	3
Defined contribution cost	**85**	90	**-**	-
Net benefit cost	**$ 135**	$ 149	**$ 2**	$ 3

(1) There are no significant current service costs for the retiree welfare plans as they are closed and mostly frozen. The remeasurement gain or loss on these plans is due to the volatility of discount rates and investment returns.

(h) Re-measurement effects recognized in Other Comprehensive Income

The following table presents components of the re-measurement effects recognized in Other Comprehensive Income for the pension plans and retiree welfare plans.

	Pension plans		Retiree welfare plans	
For the years ended December 31,	**2022**	2021	**2022**	2021
Actuarial gains (losses) on defined benefit obligations due to:				
Experience	**$ (5)**	$ (3)	**$ 13**	$ -
Demographic assumption changes	**-**	(7)	**-**	(1)
Economic assumption changes	**835**	194	**112**	29
Return on plan assets (excluding interest income)	**(869)**	70	**(91)**	(1)
Change in effect of asset limit (excluding interest)	**(10)**	(37)	**-**	-
Total re-measurement effects	**$ (49)**	$ 217	**$ 34**	$ 27

(i) Assumptions

The following table presents key assumptions used by the Company to determine the defined benefit obligation and net benefit cost for the defined benefit pension plans and retiree welfare plans.

	U.S. Plans				**Canadian Plans**			
	Pension plans		Retiree welfare plans		Pension plans		Retiree welfare plans	
For the years ended December 31,	**2022**	2021	**2022**	2021	**2022**	2021	**2022**	2021
To determine the defined benefit obligation at end of year[1]:								
Discount rate	**5.0%**	2.7%	**5.0%**	2.7%	**5.3%**	3.1%	**5.3%**	3.2%
Initial health care cost trend rate[2]	**n/a**	n/a	**7.8%**	7.0%	**n/a**	n/a	**5.3%**	5.4%
To determine the defined benefit cost for the year[1]:								
Discount rate	**2.7%**	2.4%	**2.7%**	2.4%	**3.1%**	2.5%	**3.2%**	2.6%
Initial health care cost trend rate[2]	**n/a**	n/a	**7.0%**	7.3%	**n/a**	n/a	**5.4%**	5.5%

(1) Inflation and salary increase assumptions are not shown as they do not materially affect obligations and cost.

(2) The health care cost trend rate used to measure the U.S. based retiree welfare obligation was 7.8% grading to 4.8% for 2035 and years thereafter (2021 – 7.0% grading to 4.5% for 2032) and to measure the net benefit cost was 7.0% grading to 4.5% for 2032 and years thereafter (2021 – 7.3% grading to 4.5% for 2032). In Canada, the rate used to measure the retiree welfare obligation was 5.3% grading to 4.8% for 2026 and years thereafter (2021 – 5.4% grading to 4.8% for 2026) and to measure the net benefit cost was 5.4% grading to 4.8% for 2026 and years thereafter (2021 – 5.5% grading to 4.8% for 2026).

Assumptions regarding future mortality are based on published statistics and mortality tables. The following table presents current life expectancies underlying the values of the obligations in the defined benefit pension and retiree welfare plans.

As at December 31, 2022	U.S.	Canada
Life expectancy (in years) for those currently age 65		
Males	**22.1**	**23.9**
Females	**23.6**	**25.7**
Life expectancy (in years) at age 65 for those currently age 45		
Males	**23.5**	**24.8**
Females	**25.0**	**26.6**

(j) Sensitivity of assumptions on obligations

Assumptions used can have a significant effect on the obligations reported for defined benefit pension and retiree welfare plans. The following table sets out the potential impact on the obligations arising from changes in the key assumptions. The sensitivities assume all other assumptions are held constant. In actuality, inter-relationships with other assumptions may exist.

As at December 31, 2022	Pension plans	Retiree welfare plans
Discount rate:		
Impact of a 1% increase	**$ (279)**	**$ (39)**
Impact of a 1% decrease	**322**	**45**
Health care cost trend rate:		
Impact of a 1% increase	**n/a**	**10**
Impact of a 1% decrease	**n/a**	**(9)**
Mortality rates[(1)]		
Impact of a 10% decrease	**93**	**8**

(1) If the actuarial estimates of mortality are adjusted in the future to reflect unexpected decreases in mortality, the effect of a 10% decrease in mortality rates at each future age would be an increase in life expectancy at age 65 of 0.8 years for U.S. males and females, 0.8 years for Canadian females and 0.7 years for Canadian males, respectively.

(k) Maturity profile

The following table presents weighted average duration (in years) of the defined benefit obligations.

	Pension plans		Retiree welfare plans	
As at December 31,	**2022**	2021	**2022**	2021
U.S. plans	**8.2**	9.7	**8.2**	9.5
Canadian plans	**10.6**	12.4	**11.1**	13.3

(l) Cash flows – contributions

The following table presents total cash payments for all employee future benefits, comprised of cash contributed by the Company to funded defined benefit pension and retiree welfare plans, cash payments directly to beneficiaries in respect of unfunded pension and retiree welfare plans, and cash contributed to defined contribution pension plans.

	Pension plans		Retiree welfare plans	
For the years ended December 31,	**2022**	2021	**2022**	2021
Defined benefit plans	**$ 59**	$ 61	**$ 11**	$ 11
Defined contribution plans	**85**	90	**-**	-
Total	**$ 144**	$ 151	**$ 11**	$ 11

The Company's best estimate of expected cash payments for employee future benefits for the year ending December 31, 2023 is $65 for defined benefit pension plans, $89 for defined contribution pension plans and $13 for retiree welfare plans.

Note 16 Income Taxes

(a) Income tax expense

The following table presents income tax expense (recovery) recognized in the Consolidated Statements of Income:

For the years ended December 31,	2022	2021
Current tax		
Current year	**$ 1,097**	$ 1,396
Adjustments related to prior years	**(263)**	(51)
Total current tax	**834**	1,345
Deferred tax		
Change related to temporary differences	**868**	(46)
Adjustments related to prior years	**226**	13
Effects of change in tax rates in Canada	**(186)**	-
Total deferred tax	**908**	(33)
Income tax expense	**$ 1,742**	$ 1,312

The following table discloses income tax expense (recovery) recognized directly in equity.

For the years ended December 31,		2022		2021
Recognized in other comprehensive income				
Current income tax expense (recovery)	**$**	**(324)**	$	(9)
Deferred income tax expense (recovery)		**(864)**		(66)
Total recognized in other comprehensive income	**$**	**(1,188)**	$	(75)
Recognized in equity, other than other comprehensive income				
Current income tax expense (recovery)	**$**	**4**	$	5
Deferred income tax expense (recovery)		**(151)**		(133)
Total income tax recognized directly in equity	**$**	**(147)**	$	(128)

(b) Current tax receivable and payable

As at December 31, 2022, the Company had approximately $1,135 of current tax receivable included in other assets (2021 - $660) and a current tax payable of $194 included in other liabilities (2021 - $357).

(c) Tax reconciliation

The effective income tax rate reflected in the Consolidated Statements of Income varies from the Canadian tax rate of 27.50 per cent for the year ended December 31, 2022 (2021 – 26.50 per cent) for the items outlined in the following table. The Canadian tax rate became substantively enacted in December 2022 with an effective date of April 7, 2022.

For the years ended December 31,		2022		2021
Income before income taxes	**$**	**9,216**	$	8,461
Income tax expense at Canadian statutory tax rate	**$**	**2,534**	$	2,242
Increase (decrease) in income taxes due to:				
Tax-exempt investment income		**(213)**		(261)
Differences in tax rate on income not subject to tax in Canada		**(839)**		(917)
Adjustments to taxes related to prior years		**(37)**		(38)
Tax losses and temporary differences not recognized as deferred taxes		**86**		53
Tax rate change in Canada		**(186)**		-
Other differences		**397**		233
Income tax expense	**$**	**1,742**	$	1,312

(d) Deferred tax assets and liabilities

The following table presents the Company's deferred tax assets and liabilities reflected on the Consolidated Statement of Financial Position.

As at December, 31		2022		2021
Deferred tax assets	**$**	**5,363**	$	5,227
Deferred tax liabilities		**(2,774)**		(2,769)
Net deferred tax assets (liabilities)	**$**	**2,589**	$	2,458

The following table presents movement of deferred tax assets and liabilities.

As at December 31, 2022	Balance, January 1, 2022	Disposals	Recognized in Income Statement	Recognized in Other Comprehensive Income	Recognized in Equity	Translation and Other	Balance, December 31, 2022
Loss carryforwards	$ 500	$ -	$ (3)	$ -	$ 151	$ -	$ 648
Actuarial liabilities	8,703	-	(5,537)	-	1	374	3,541
Pensions and post-employment benefits	161	-	(1)	(17)	-	-	143
Tax credits	41	-	62	-	-	-	103
Accrued interest	1	-	-	-	-	-	1
Real estate	(1,171)	-	(20)	(1)	-	(37)	(1,229)
Securities and other investments	(5,088)	-	4,552	882	(1)	(250)	95
Sale of investments	(41)	-	10	-	-	-	(31)
Goodwill and intangible assets	(804)	-	(4)	-	-	(17)	(825)
Other	156	-	33	-	-	(46)	143
Total	$ 2,458	$ -	$ (908)	$ 864	$ 151	$ 24	$ 2,589

As at December 31, 2021	Balance, January 1, 2021	Disposals	Recognized in Income Statement	Recognized in Other Comprehensive Income	Recognized in Equity	Translation and Other	Balance, December 31, 2021
Loss carryforwards	$ 447	$ (10)	$ (78)	$ -	$ 132	$ 9	$ 500
Actuarial liabilities	9,369	-	(666)	-	-	-	8,703
Pensions and post-employment benefits	215	-	7	(61)	-	-	161
Tax credits	29	-	11	1	-	-	41
Accrued interest	1	-	-	-	-	-	1
Real estate	(1,033)	-	(145)	-	-	7	(1,171)
Securities and other investments	(5,905)	-	643	125	-	49	(5,088)
Sale of investments	(57)	-	16	-	-	-	(41)
Goodwill and intangible assets	(848)	-	29	-	-	15	(804)
Other	(46)	1	216	1	1	(17)	156
Total	$ 2,172	$ (9)	$ 33	$ 66	$ 133	$ 63	$ 2,458

The total deferred tax assets as at December 31, 2022 of $5,363 (2021 – $5,227) include $40 (2021 – $935) where the Company has suffered losses in either the current or preceding year and where the recognition is dependent on future taxable profits in the relevant jurisdictions and feasible management actions.

As at December 31, 2022, tax loss carryforwards available were approximately $3,712 (2021 – $2,625) of which $3,494 expire between the years 2025 and 2042 while $218 have no expiry date, and capital loss carryforwards available were approximately $1 (2021 – $1) and have no expiry date. A $648 (2021 – $500) tax benefit related to these tax loss carryforwards has been recognized as a deferred tax asset as at December 31, 2022, and a benefit of $211 (2021 – $120) has not been recognized. The Company has approximately $267 (2021 – $195) of tax credit carryforwards which will expire between the years 2026 and 2042 of which a benefit of $164 (2021 – $154) has not been recognized. In addition, the Company has not recognized a deferred tax asset of $507 (2021 – $490) on other temporary differences of $1,829 (2021 – $1,867).

The total deferred tax liability as at December 31, 2022 was $2,774 (2021 – $2,769). This amount includes the deferred tax liability of consolidated entities. The aggregate amount of taxable temporary differences associated with the Company's own investments in subsidiaries is not included in the Consolidated Financial Statements and was $38,023 (2021 – $39,588).

Note 17 Interests in Structured Entities

The Company is involved with both consolidated and unconsolidated structured entities ("SEs") which are established to generate investment and fee income. The Company is also involved with SEs that are used to facilitate financing for the Company. These entities may have some or all the following features: control is not readily identified based on voting rights; restricted activities designed to achieve a narrow objective; high amount of leverage; and/or highly structured capital.

The Company only discloses its involvement in significant consolidated and unconsolidated SEs. In assessing the significance, the Company considers the nature of its involvement with the SE, including whether it is sponsored by the Company (i.e. initially organized and managed by the Company). Other factors considered include the Company's investment in the SE as compared to total investments, its returns from the SE as compared to total net investment income, the SE's size as compared to total funds under management, and its exposure to any other risks from its involvement with the SE.

The Company does not provide financial or other support to its SEs, when it does not have a contractual obligation to do so.

(a) Consolidated SEs

Investment SEs

The Company acts as an investment manager of timberlands and timber companies. The Company's general fund and segregated funds invest in many of these companies. The Company has control over one timberland company which it manages, Hancock Victoria Plantations Holdings PTY Limited ("HVPH"). HVPH is a SE primarily because the Company's employees exercise voting rights over it on behalf of other investors. As at December 31, 2022, the Company's consolidated timber assets relating to HVPH were $1,264 (2021 – $979). The Company does not provide guarantees to other parties against the risk of loss from HVPH.

Financing SEs

The Company securitizes certain HELOC collateralized by residential property. This activity is facilitated by consolidated entities that are SEs because their operations are limited to issuing and servicing the Company's funding. Further information regarding the Company's mortgage securitization program is included in note 4.

(b) Unconsolidated SEs

Investment SEs

The following table presents the Company's investments and maximum exposure to loss from significant unconsolidated investment SEs, some of which are sponsored by the Company. The Company does not provide guarantees to other parties against the risk of loss from these SEs.

	Company's investment[1]		Company's maximum exposure to loss[2]	
As at December 31,	**2022**	2021	**2022**	2021
Leveraged leases[3]	**$ 3,840**	$ 3,457	**$ 3,840**	$ 3,457
Timberland companies[4]	**816**	842	**816**	842
Real estate companies[5]	**465**	513	**465**	513
Total	**$ 5,121**	$ 4,812	**$ 5,121**	$ 4,812

(1) The Company's investments in these unconsolidated SEs are included in invested assets and the Company's returns from them are included in net investment income and AOCI.

(2) The Company's maximum exposure to loss from each SE is limited to amounts invested in each, plus unfunded capital commitments, if any. The Company's investment commitments are disclosed in note 18. The maximum loss is expected to occur only upon the entity's bankruptcy/liquidation, or in case a natural disaster in the case of the timber companies.

(3) These entities are statutory business trusts which use capital provided by the Company and senior debt provided by other parties to finance the acquisition of assets. These assets are leased to third-party lessees under long-term leases. The Company owns equity capital in these business trusts. The Company does not consolidate any of the trusts that are party to the lease arrangements because the Company does not have decision-making power over them.

(4) These entities own and operate timberlands. The Company invests in their equity and debt. The Company's returns include investment income, investment advisory fees, forestry management fees and performance advisory fees. The Company does not control these entities because it either does not have the power to govern their financial and operating policies or does not have significant variable returns from them, or both.

(5) These entities, which include the Manulife U.S. REIT, own and manage commercial real estate. The Company invests in their equity. The Company's returns include investment income, investment management fees, property management fees, acquisition/disposition fees and leasing fees. The Company does not control these entities because it either does not have the power to govern their financial and operating policies or does not have significant variable returns from them, or both.

Financing SEs

The Company's interests in and maximum exposure to loss from significant unconsolidated financing SEs are as follows.

	Company's interests[1]	
As at December 31,	**2022**	2021
Manulife Finance (Delaware), L.P.[2]	**$ 694**	$ 852
Total	**$ 694**	$ 852

[1] The Company's interests include amounts borrowed from the SE; the Company's investment in its equity and subordinated capital; and foreign currency and interest rate swaps with it.

[2] This entity is a partially owned partnership used to facilitate the Company's financing. Refer to notes 10 and 18.

(i) Other invested assets

The Company has investment relationships with a variety of other entities, which result from its direct investment in their debt and/or equity and which have been assessed for control. These other entities' investments include but are not limited to investments in power and infrastructure, oil and gas, private equity, real estate and agriculture, organized as limited partnerships and limited liability companies. Most of these other entities are not sponsored by the Company. The Company's involvement with these other entities is not individually significant. As such, the Company neither provides summary financial data for these entities nor individually assesses whether they are SEs. The Company's maximum exposure to losses because of its involvement with these other entities is limited to its investment in them and amounts committed to be invested but not yet funded. The Company records its income from these entities in net investment income and AOCI. The Company does not provide guarantees to other parties against the risk of loss from these other entities.

(ii) Interest in securitized assets

The Company invests in mortgage/asset-backed securities issued by securitization vehicles sponsored by other parties, including private issuers and government sponsored issuers, to generate investment income. The Company does not own a controlling financial interest in any of the issuers. These securitization vehicles are SEs based on their narrow scope of activities and highly leveraged capital structures. Investments in mortgage/asset-backed securities are reported on the Consolidated Statements of Financial Position as debt securities and private placements, and their fair value and carrying value are disclosed in note 4. The Company's maximum loss from these investments is limited to amounts invested.

Commercial mortgage-backed securities ("CMBS") are secured by commercial mortgages and residential mortgage backed securities ("RMBS") are secured by residential mortgages. Asset-backed securities ("ABS") may be secured by various underlying assets including credit card receivables, automobile loans and aviation leases. The mortgage/asset-backed securities that the Company invests in primarily originate in North America.

The following table presents investments in securitized holdings by the type and asset quality.

	2022				2021
As at December 31,	CMBS	RMBS	ABS	Total	Total
AAA	**$ 675**	**$ 5**	**$ 1,095**	**$ 1,775**	$ 2,346
AA	**-**	**3**	**6**	**9**	11
A	**56**	**-**	**534**	**590**	641
BBB	**-**	**-**	**232**	**232**	227
BB and below	**-**	**-**	**3**	**3**	4
Total company exposure	**$ 731**	**$ 8**	**$ 1,870**	**$ 2,609**	$ 3,229

(iii) Mutual funds

The Company sponsors and may invest in a range of public mutual funds with a broad range of investment styles. As sponsor, the Company organizes mutual funds that implement investment strategies on behalf of current and future investors. The Company earns fees which are at market rates for providing advisory and administrative services to these mutual funds. Generally, the Company does not control its sponsored mutual funds because either the Company does not have power to govern their financial and operating policies, or its returns in the form of fees and ownership interests are not significant, or both. Certain mutual funds are SEs because their decision-making rights are not vested in voting equity interests and their investors are provided with redemption rights.

The Company's relationships with these mutual funds are not individually significant. As such, the Company neither provides summary financial data for these mutual funds nor individually assesses whether they are SEs. The Company's interest in mutual funds is limited to its investment and fees earned, if any. The Company's investments in mutual funds are recorded as part of its investment in public equities within the Consolidated Statements of Financial Position. For information regarding the Company's invested assets, refer to note 4. The Company does not provide guarantees to other parties against the risk of loss from these mutual funds.

As sponsor, the Company's investment in ("seed") startup capital of mutual funds as at December 31, 2022 was $1,296 (2021 – $1,361). The Company's retail mutual fund assets under management as at December 31, 2022 were $258,183 (2021 – $290,863).

Note 18 Commitments and Contingencies

(a) Legal proceedings

The Company is regularly involved in legal actions, both as a defendant and as a plaintiff. The legal actions where the Company is a party ordinarily relate to its activities as a provider of insurance protection or wealth management products, reinsurance, or in its capacity as an investment adviser, employer, or taxpayer. Other life insurers and asset managers, operating in the jurisdictions in which the Company does business, have been subject to a wide variety of other types of actions, some of which resulted in substantial judgments or settlements against the defendants; it is possible that the Company may become involved in similar actions in the future. In addition, government and regulatory bodies in Canada, the United States, Asia and other jurisdictions where the Company conducts business regularly make inquiries and, from time to time, require the production of information or conduct examinations concerning the Company's compliance with, among other things, insurance laws, securities laws, and laws governing the activities of broker-dealers.

In June 2018, a class action was initiated against John Hancock Life Insurance Company (U.S.A.) ("JHUSA") and John Hancock Life Insurance Company of New York ("JHNY") in the U.S. District Court for the Southern District of New York on behalf of owners of approximately 1,500 Performance Universal Life ("PerfUL") policies issued between 2003 and 2010 whose policies were subject to a Cost of Insurance ("COI") increase announced in 2018. On May 17, 2022, at a Fairness Hearing, the Court approved the class Settlement Agreement that it had preliminary approved on January 5, 2022. The settlement has been implemented. In the Class Notice process, an institutional investor which owns approximately 150 of the policies that met the class definition "opted out" of the settlement. No subsequent action has thus far been taken with respect to those opt out policies.

In addition to the class action, eleven individual lawsuits opposing the Performance UL COI increases were also filed. Each of the lawsuits, except two, is brought by plaintiffs owning multiple policies and/or by entities managing them for investment purposes. Three of the pending federal cases have now been settled and these involved a combined 46 PerfUL policies. On September 8, 2022, two new individual lawsuits were filed in New York and California federal courts, with respect to the 16 policies owned by Skellig Capital. There are now five lawsuits pending in federal courts in New York and California and three in New York state court. In the aggregate, approximately 135 PerfUL policies are involved in these cases. There are also approximately 140 policies that have been "opted out" of the class settlement, and although no litigation is pending with respect to those policies, future litigation is possible if not probable. Of the remaining non-class/individual lawsuits, discovery has commenced. With respect to the non-class/individual lawsuits pending in the New York federal district court (not including the recently filed Skellig lawsuits), the court has approved a briefing schedule and set the final pre-trial hearing for February 23, 2023. The Company continues to defend the individual lawsuits. In 2021, the Company recorded an accrual in relation to the class and individual lawsuits. In Q3 2022, the accrual was increased.

(b) Investment commitments

In the normal course of business, various investment commitments are outstanding which are not reflected in the Consolidated Financial Statements. There were $14,193 (2021 – $12,233) of outstanding investment commitments as at December 31, 2022, of which $1,095 (2021 – $957) mature in 30 days, $3,359 (2021 – $3,205) mature in 31 to 365 days and $9,739 (2021 – $8,071) mature after one year.

(c) Letters of credit

In the normal course of business, third-party relationship banks issue letters of credit on the Company's behalf. The Company's businesses utilize letters of credit for which third parties are the beneficiaries, as well as for affiliate reinsurance transactions between its subsidiaries. As at December 31, 2022, letters of credit for which third parties are beneficiary, in the amount of $215 (2021 – $99), were outstanding.

(d) Guarantees

JHUSA maintains a book of deferred annuity contracts that feature a market value adjustment. The deferred annuity contracts may contain variable investment options along with fixed investment period options or may offer only fixed investment period options. The fixed investment period options enable the participant to invest fixed amounts of money for fixed terms at fixed interest rates, subject to a market value adjustment if the participant desires to terminate a fixed investment period before its maturity date. These fixed investment period options that contain a market value adjustment feature are referred to as "MVAs". MFC fully and unconditionally guaranteed JHUSA's MVAs, both those outstanding and those to be issued subsequently.

JHUSA has sold medium-term notes to retail investors under its SignatureNotes program. MFC fully and unconditionally guaranteed JHUSA's outstanding SignatureNotes. MFC's guarantees of the MVAs and the SignatureNotes are unsecured obligations of MFC and are subordinated in right of payment to the prior payment in full of all other obligations of MFC, except for other guarantees or obligations of MFC which by their terms are designated as ranking equally in right of payment with or subordinate to MFC's guarantees of the MVAs and SignatureNotes.

(e) Pledged assets

In the normal course of business, the Company pledges its assets in respect of liabilities incurred, strictly for providing collateral to the counterparty. In the event of the Company's default, the counterparty is entitled to apply the collateral to settle the liability. The pledged assets are returned to the Company if the underlying transaction is terminated or, in the case of derivatives, if there is a decrease in the net exposure due to market value changes.

The amounts pledged are as follows.

As at December 31,	2022 Debt securities	2022 Other	2021 Debt securities	2021 Other
In respect of:				
Derivatives	**$ 11,944**	**$ 23**	$ 5,525	$ 23
Secured borrowings	**-**	**2,385**	-	2,575
Regulatory requirements	**320**	**77**	367	78
Repurchase agreements	**886**	**-**	535	-
Non-registered retirement plans in trust	**-**	**326**	-	377
Other	**-**	**404**	2	414
Total	**$ 13,150**	**$ 3,215**	$ 6,429	$ 3,467

(f) Participating business

In some territories where the Company maintains participating accounts, there are regulatory restrictions on the amounts of profit that can be transferred to the shareholder. Where applicable, these restrictions generally take the form of a fixed percentage of policyholder dividends. For participating businesses operating as separate "closed blocks", transfers are governed by the terms of MLI's and John Hancock Mutual Life Insurance Company's plans of demutualization.

(g) Fixed surplus notes

A third party contractually provides standby financing arrangements for the Company's U.S. operations under which, in certain circumstances, funds may be provided in exchange for the issuance of fixed surplus notes. As at December 31, 2022, the Company had no fixed surplus notes outstanding.

Note 19 Segmented Information

The Company's reporting segments are Asia, Canada, U.S., Global WAM and Corporate and Other. Each reporting segment is responsible for managing its operating results, developing products, defining strategies for services and distribution based on the profile and needs of its business and market. The Company's significant product and service offerings by the reporting segments are mentioned below.

Wealth and asset management businesses (Global WAM) – branded as Manulife Investment Management, provides investment advice and innovative solutions to retirement, retail, and institutional clients. Products and services are distributed through multiple distribution channels, including agents and brokers affiliated with the Company, independent securities brokerage firms and financial advisors pension plan consultants and banks.

Insurance and annuity products (Asia, Canada and U.S.) – include a variety of individual life insurance, individual and group long-term care insurance and guaranteed and partially guaranteed annuity products. Products are distributed through multiple distribution channels, including insurance agents, brokers, banks, financial planners and direct marketing. Manulife Bank of Canada offers a variety of deposit and credit products to Canadian customers.

Corporate and Other Segment – comprised of investment performance of assets backing capital, net of amounts allocated to operating segments; costs incurred by the corporate office related to shareholder activities (not allocated to the operating segments); financing costs; Property and Casualty Reinsurance Business; and run-off reinsurance operations including variable annuities and accident and health.

Reporting segments

The following table presents results by reporting segments.

As at and for the year ended December 31, 2022	Asia	Canada	U.S.	Global WAM	Corporate and Other	Total
Revenue						
Life and health insurance	$ 18,690	$ 9,945	$ 6,579	$ -	$ 269	$ 35,483
Annuities and pensions	2,786	447	(863)	-	-	2,370
Net premium income	21,476	10,392	5,716	-	269	37,853
Net investment income (loss)	(7,972)	(7,911)	(13,003)	(39)	(928)	(29,853)
Other revenue	1,458	1,426	458	6,350	(489)	9,203
Total revenue	14,962	3,907	(6,829)	6,311	(1,148)	17,203
Contract benefits and expenses						
Life and health insurance	4,976	5,945	(11,868)	-	431	(516)
Annuities and pensions	2,667	(8,738)	(2,753)	41	-	(8,783)
Net benefits and claims	7,643	(2,793)	(14,621)	41	431	(9,299)
Interest expense	234	573	67	7	98	979
Other expenses	5,024	3,506	2,847	4,717	213	16,307
Total contract benefits and expenses	12,901	1,286	(11,707)	4,765	742	7,987
Income (loss) before income taxes	2,061	2,621	4,878	1,546	(1,890)	9,216
Income tax recovery (expense)	(308)	(777)	(886)	(223)	452	(1,742)
Net income (loss)	1,753	1,844	3,992	1,323	(1,438)	7,474
Less net income (loss) attributed to:						
Non-controlling interests	(4)	-	-	2	1	(1)
Participating policyholders	(467)	314	42	-	-	(111)
Net income (loss) attributed to shareholder	$ 2,224	$ 1,530	$ 3,950	$ 1,321	$ (1,439)	$ 7,586
Total assets	$ 158,036	$ 155,049	$ 267,653	$ 231,154	$ 37,080	$ 848,972

As at and for the year ended December 31, 2021	Asia	Canada	U.S.	Global WAM	Corporate and Other	Total
Revenue						
Life and health insurance	$ 20,428	$ 9,217	$ 6,338	$ -	$ 147	$ 36,130
Annuities and pensions	2,558	344	33	-	-	2,935
Net premium income	22,986	9,561	6,371	-	147	39,065
Net investment income (loss)	4,889	1,469	5,061	28	172	11,619
Other revenue	1,696	1,336	1,824	6,513	(266)	11,103
Total revenue	29,571	12,366	13,256	6,541	53	61,787
Contract benefits and expenses						
Life and health insurance	18,240	10,276	9,307	-	159	37,982
Annuities and pensions	2,638	(3,371)	(1,528)	101	-	(2,160)
Net benefits and claims	20,878	6,905	7,779	101	159	35,822
Interest expense	232	269	47	1	86	635
Other expenses	5,273	3,401	2,947	4,798	450	16,869
Total contract benefits and expenses	26,383	10,575	10,773	4,900	695	53,326
Income (loss) before income taxes	3,188	1,791	2,483	1,641	(642)	8,461
Income tax recovery (expense)	(445)	(336)	(385)	(233)	87	(1,312)
Net income (loss)	2,743	1,455	2,098	1,408	(555)	7,149
Less net income (loss) attributed to:						
Non-controlling interests	253	-	-	2	-	255
Participating policyholders	(567)	101	18	-	-	(448)
Net income (loss) attributed to shareholder	$ 3,057	$ 1,354	$ 2,080	$ 1,406	$ (555)	$ 7,342
Total assets	$ 162,970	$ 169,736	$ 290,838	$ 259,363	$ 35,303	$ 918,210

Geographical location

The results of the Company's reporting segments differ from its geographical location primarily due to the allocation of Global WAM and Corporate and Other segments into the geographical location to which its businesses relate.

The following table presents results by geographical location.

For the year ended December 31, 2022	Asia	Canada	U.S.	Other	Total
Revenue					
Life and health insurance	**$ 18,786**	**$ 9,615**	**$ 6,580**	**$ 502**	**$ 35,483**
Annuities and pensions	**2,786**	**447**	**(863)**	**-**	**2,370**
Net premium income	**21,572**	**10,062**	**5,717**	**502**	**37,853**
Net investment income (loss)	**(8,468)**	**(8,418)**	**(13,288)**	**321**	**(29,853)**
Other revenue	**2,702**	**3,285**	**3,217**	**(1)**	**9,203**
Total revenue	**$ 15,806**	**$ 4,929**	**$ (4,354)**	**$ 822**	**$ 17,203**

For the year ended December 31, 2021	Asia	Canada	U.S.	Other	Total
Revenue					
Life and health insurance	$ 20,515	$ 8,905	$ 6,340	$ 370	$ 36,130
Annuities and pensions	2,558	344	33	-	2,935
Net premium income	23,073	9,249	6,373	370	39,065
Net investment income (loss)	5,313	1,250	4,830	226	11,619
Other revenue	2,818	3,334	4,952	(1)	11,103
Total revenue	$ 31,204	$ 13,833	$ 16,155	$ 595	$ 61,787

Note 20 Related Party Transactions

The Company enters into transactions with related parties in the normal course of business and at the terms that would exist in arm's-length transactions.

(a) Related party notes

The following table presents related party notes receivable and payable.

As at December 31,			2022		2021	
	Interest terms	Maturity date	Carrying value	Fair value(1)	Carrying value	Fair value(1)
Note receivable from MFC	Interest free	Demand	**$ 86**	**$ 86**	$ 505	$ 505
Note payable to MFC	Interest free	Demand	**135**	**135**	129	129

(1) Fair value has been determined using Level 2 measurements as defined in note 1.

(b) Related party capital instruments

			2022		2021	
As at December 31,	Interest terms	Maturity date	Carrying value	Fair value(1)	Carrying value	Fair value(1)
Payable to Manulife Finance (Delaware) LLC ("MFLLC")	90-day Bankers' Acceptance rate plus 0.72%, payable semi-annually(2)	December 15, 2036	**$ 647**	**$ 620**	$ 647	$ 647

(1) Fair value has been determined using Level 2 measurements as defined in note 1.
(2) The Company is monitoring regulatory and market developments globally with respect to the interest rate benchmark reform. As this rate will be discontinued at the end of June 2024, the Company will take appropriate actions in due course to accomplish the necessary transitions or replacements.

The cash amount of interest paid during the year ended December 31, 2022 related to related party capital instruments was $18 (2021 – $8).

(c) Other related party transactions

On December 29, 2022, MLI transferred to MFC $6,253 in cash as settlement of liabilities and dividends on common shares. On December 29, 2022, MFC transferred to MLI $6,240 in cash as settlement of liabilities. All transactions were accounted for at carrying value.

On December 29, 2021, MLI transferred to MFC $15,486 in debt securities and short-term investments as settlement of liabilities, dividends on common shares, and as a loan. On December 31, 2021, MFC transferred to MLI $15,564 in debt securities and short-term investments as settlement of liabilities and as liquidity pool contributions. All transactions were accounted for at carrying value.

The Company owns and manages liquidity pools in which various entities from within the MFC consolidated group, including MLI subsidiaries and entities which are not MLI subsidiaries, invest excess cash. The liquidity pool structure allows the pooling of excess cash in a centralized location until such funds are needed by the contributing entities. The resulting economies of scale allow the Company and participating legal entities to earn improved returns on excess cash and reduce the need for any external short-term operational borrowing. Multiple liquidity pools are used due to varying regulatory considerations of different jurisdictions. Participation in the Company's liquidity pools is evidenced by demand promissory notes issued by the Company, bearing interest at rates based on the one-month Canadian Bankers' Acceptance rate, the one-month U.S. Dollar London Interbank Bid rate ("USD LIBOR"), and at the one-month U.S. Treasury Bill rate. These rates are reset daily. Rates subject to the interest rate benchmark reform, including USD LIBOR and the Canadian Dollar Offered Rate ("CDOR"), will be discontinued at the end of June 2023 and June 2024, respectively and the Company will take appropriate actions in due course to accomplish the necessary transitions or replacements. The Company will switch to other reference rates, for example, replacing USD LIBOR with the Secured Overnight Financing Rate ("SOFR") and replacing CAD CDOR with the Canadian Overnight Repo Rate ("CORRA") on the liquidity pool contributions. As at December 31, 2022, the interest rate benchmark reform has not resulted in significant changes in the Company's risk management strategy. As at December 31, 2022, the balance contributed to the liquidity pools from MFC entities outside the MLI consolidated group was $48 (2021 – $61) and the balance contributed by the Company to another MFC liquidity pool outside the MLI consolidated group was $133 (2021 – $437). These balances are netted against cash and short-term securities, in an aggregate amount totaling $(85) (2021 – $(376)).

In 2016, the Company entered into three foreign exchange swap contracts with MFC, maturing in 2026 and 2046. In 2017, the Company entered into a foreign exchange swap contract with MFC, maturing in 2024. In 2020, the Company entered into a foreign exchange swap contract with MFC, maturing in 2027. As at December 31, 2022, the swap contracts required the Company to pay US $2,720 (2021 – US $2,720) and to pay S$500 (2021 – S$500) and entitled it to receive $4,151 (2021 – $4,151). The US Dollar contracts were designated as net investment hedges. The Singapore Dollar contracts were not designated as net investment hedges. The fair value of these contracts as at December 31, 2022 was $(26) (2021 – $113).

MLI received all of the issued and outstanding shares of certain MFC subsidiaries on a tax deferred basis from MFC on December 29, 2022. These subsidiaries were then wound up into MLI on December 30, 2022. Contributed surplus of $137 (2021 – $132) was recorded in MLI and/or its subsidiaries on the recognition of deferred income tax assets in respect of income tax losses.

As at December 31, 2022, the Company had payables to MFC of $13 (2021 – $20).

The Company has service agreements with MFC to receive and provide administrative services. In 2022, the Company paid $5 (2021 –$19) for net services received.

Compensation is provided to certain employees and directors of the Company in the form of MFC stock options, deferred share units and restricted share units. For the year ended December 31, 2022, the amounts charged to the Company by MFC representing the fair value under these plans totaled $186 (2021 – $178). Refer to note 14.

(d) Compensation of key management personnel

The Company's key management personnel are those personnel who have the authority and responsibility for planning, directing and controlling the activities of the Company. Directors (both executive and non-executive) and senior management are considered key management personnel. A summary of compensation of key management personnel is as follows.

For the years ended December 31,		**2022**		2021
Short-term employee benefits	**$**	**73**	$	65
Post-employment benefits		**6**		5
Share-based payments		**73**		57
Termination benefits		**-**		-
Other long-term benefits		**3**		2
Total	**$**	**155**	$	129

Note 21 Subsidiaries

The following is a list of Manulife's directly and indirectly held major operating subsidiaries.

As at December 31, 2022 (100% owned unless otherwise noted in brackets beside company name)	Equity interest	Address	Description
Manulife Holdings (Alberta) Limited	**$ 21,640**	Calgary, Canada	Holding company
John Hancock Financial Corporation		Boston, U.S.A.	Holding company
The Manufacturers Investment Corporation		Boston, U.S.A.	Holding company
John Hancock Reassurance Company Ltd.		Boston, U.S.A.	Captive insurance subsidiary that provides life, annuity and long-term care reinsurance to affiliates
John Hancock Life Insurance Company (U.S.A.)		Boston, U.S.A.	U.S. life insurance company licensed in all states, except New York
John Hancock Subsidiaries LLC		Boston, U.S.A.	Holding company
John Hancock Financial Network, Inc.		Boston, U.S.A.	Financial services distribution organization
John Hancock Investment Management LLC		Boston, U.S.A.	Investment advisor
John Hancock Investment Management Distributors LLC		Boston, U.S.A.	Broker-dealer
Manulife Investment Management (US) LLC		Boston, U.S.A.	Investment advisor
Manulife Investment Management Timberland and Agriculture Inc.		Boston, U.S.A.	Manager of globally diversified timberland and agricultural portfolios
John Hancock Life Insurance Company of New York		New York, U.S.A.	U.S. life insurance company licensed in New York
John Hancock Variable Trust Advisers LLC		Boston, U.S.A.	Investment advisor for open-end mutual funds
John Hancock Life & Health Insurance Company		Boston, U.S.A.	U.S. life insurance company licensed in all states
John Hancock Distributors LLC		Boston, U.S.A.	Broker-dealer

As at December 31, 2022 (100% owned unless otherwise noted in brackets beside company name)	Equity interest	Address	Description
John Hancock Insurance Agency, Inc.		Boston, U.S.A.	Insurance agency
Manulife Reinsurance Limited		Hamilton, Bermuda	Provides life and financial reinsurance to affiliates
Manulife Reinsurance (Bermuda) Limited		Hamilton, Bermuda	Provides life and annuity reinsurance to affiliates
Manulife Bank of Canada	$ 1,788	Waterloo, Canada	Provides integrated banking products and service options not available from an insurance company
Manulife Investment Management Holdings (Canada) Inc.	$ 1,179	Toronto, Canada	Holding company
Manulife Investment Management Limited		Toronto, Canada	Provides investment counseling, portfolio and mutual fund management in Canada
First North American Insurance Company	$ 7	Toronto, Canada	Property and casualty insurance company
Manulife Securities Investment Services Inc.	$ 80	Oakville, Canada	Mutual fund dealer for Canadian operations
Manulife Holdings (Bermuda) Limited	$ 22,841	Hamilton, Bermuda	Holding company
Manufacturers P&C Limited		St. Michael, Barbados	Provides property and casualty reinsurance
Manulife Financial Asia Limited		Hong Kong, China	Holding company
Manulife (Cambodia) PLC		Phnom Penh, Cambodia	Life insurance company
Manulife Myanmar Life Insurance Company Limited		Yangon, Myanmar	Life insurance company
Manufacturers Life Reinsurance Limited		St. Michael, Barbados	Provides life and annuity reinsurance to affiliates
Manulife (Vietnam) Limited		Ho Chi Minh City, Vietnam	Life insurance company
Manulife Investment Fund Management (Vietnam) Company Limited		Ho Chi Minh City, Vietnam	Fund management company
Manulife International Holdings Limited		Hong Kong, China	Holding company
Manulife (International) Limited		Hong Kong, China	Life insurance company
Manulife-Sinochem Life Insurance Co. Ltd. (51%)		Shanghai, China	Life insurance company

As at December 31, 2022 (100% owned unless otherwise noted in brackets beside company name)	Equity interest	Address	Description
Manulife Investment Management International Holdings Limited		Hong Kong, China	Holding company
Manulife Investment Management (Hong Kong) Limited		Hong Kong, China	Investment management and advisory company marketing mutual funds
Manulife Investment Management (Taiwan) Co., Ltd.		Taipei, Taiwan (China)	Investment management company
Manulife Life Insurance Company (Japan)		Tokyo, Japan	Life insurance company
Manulife Investment Management (Japan) Limited		Tokyo, Japan	Investment management and advisory company and mutual fund business
Manulife Holdings Berhad (61.6%)		Kuala Lumpur, Malaysia	Holding company
Manulife Insurance Berhad (61.6%)		Kuala Lumpur, Malaysia	Life insurance company
Manulife Investment Management (Malaysia) Berhad (61.6%)		Kuala Lumpur, Malaysia	Asset management company
Manulife (Singapore) Pte. Ltd.		Singapore	Life insurance company
Manulife Investment Management (Singapore) Pte. Ltd.		Singapore	Asset management company
The Manufacturers Life Insurance Co. (Phils.), Inc.		Makati City, Philippines	Life insurance company
Manulife Chinabank Life Assurance Corporation (60%)		Makati City, Philippines	Life insurance company
PT Asuransi Jiwa Manulife Indonesia		Jakarta, Indonesia	Life insurance company
PT Manulife Aset Manajemen Indonesia		Jakarta, Indonesia	Investment management and investment advisor
Manulife TEDA Fund Management Co., Ltd		Beijing, China	Mutual fund company in China
Manulife Investment Management (Europe) Limited	$ 34	London, England	Investment management company for Manulife Financial's international funds
Manulife Assurance Company of Canada	$ 64	Toronto, Canada	Life insurance company
EIS Services (Bermuda) Limited	$ 902	Hamilton, Bermuda	Investment holding company
Berkshire Insurance Services Inc.	$ 1,868	Toronto, Canada	Investment holding company
JH Investments (Delaware) LLC		Boston, U.S.A.	Investment holding company
Manulife Securities Incorporated	$ 151	Oakville, Canada	Investment dealer
Manulife Investment Management (North America) Limited	$ 4	Toronto, Canada	Investment advisor

Note 22 Segregated Funds

The Company manages a number of segregated funds on behalf of policyholders. Policyholders are provided with the opportunity to invest in different categories of segregated funds that respectively hold a range of underlying investments. The Company retains legal title to the underlying investments; however, returns from these investments belong to the policyholders. Accordingly, the Company does not bear the risk associated with these assets outside of guarantees offered on certain variable life and annuity products. Note 9 provides information regarding risk associated with the variable annuity and segregated fund guarantees.

The composition of net assets by categories of segregated funds was within the following ranges for the years ended December 31, 2022 and 2021.

	Ranges in per cent	
Type of fund	**2022**	2021
Money market funds	**2% to 3%**	2% to 3%
Fixed income funds	**13% to 14%**	14% to 15%
Balanced funds	**22% to 23%**	22% to 23%
Equity funds	**61% to 62%**	60% to 62%

Money market funds consist of investments that have a term to maturity of less than one year. Fixed income funds primarily consist of investments in fixed grade income securities and may contain smaller investments in diversified equities or high-yield bonds. Relative to fixed income funds, balanced funds consist of fixed income securities and a larger equity investment component. The types of equity funds available to policyholders range from low volatility equity funds to aggressive equity funds. Equity funds invest in a varying mix of Canadian, U.S. and global equities.

The underlying investments of the segregated funds consist of both individual securities and mutual funds (collectively "net assets"), some of which may be structured entities. The carrying value and change in segregated funds net assets are as follows. Fair value related information of segregated funds is disclosed in note 4(g).

Segregated funds net assets

As at December 31,	**2022**	2021
Investments at market value		
Cash and short-term securities	**$ 4,280**	$ 3,955
Debt securities	**15,270**	18,651
Equities	**15,499**	16,844
Mutual funds	**308,707**	354,882
Other investments	**4,293**	4,613
Accrued investment income	**1,680**	2,340
Other assets and liabilities, net	**(796)**	(1,089)
Total segregated funds net assets	**$ 348,933**	$ 400,196
Composition of segregated funds net assets		
Held by policyholders	**$ 348,562**	$ 399,788
Held by the Company	**371**	408
Total segregated funds net assets	**$ 348,933**	$ 400,196

Changes in segregated funds net assets

For the years ended December 31,		2022		2021
Net policyholder cash flows				
Deposits from policyholders	**$**	**42,427**	$	44,548
Net transfers to general fund		**(1,267)**		(732)
Payments to policyholders		**(46,333)**		(52,182)
		(5,173)		(8,366)
Investment related				
Interest and dividends		**21,900**		24,092
Net realized and unrealized investment gains (losses)		**(78,017)**		21,549
		(56,117)		45,641
Other				
Management and administration fees		**(3,886)**		(4,115)
Impact of changes in foreign exchange rates		**13,913**		(773)
		10,027		(4,888)
Net additions (deductions)		**(51,263)**		32,387
Segregated funds net assets, beginning of year		**400,196**		367,809
Segregated funds net assets, end of year	**$**	**348,933**	$	400,196

Segregated funds assets may be exposed to a variety of financial and other risks. These risks are primarily mitigated by investment guidelines that are actively monitored by professional and experienced portfolio advisors. The Company is not exposed to these risks beyond the liabilities related to the guarantees associated with certain variable life and annuity products included in segregated funds. Accordingly, the Company's exposure to loss from segregated fund products is limited to the value of these guarantees.

These guarantees are recorded within the Company's insurance contract liabilities. Assets supporting these guarantees are recognized in invested assets according to their investment type.

Note 23 Comparatives

Certain comparative amounts have been reclassified to conform to the current year's presentation.