

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

WASHINGTON, D.C. 20549

FORM 10-Q

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended March 31, 2020

Or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission file number: 001-16209



ARCH CAPITAL GROUP LTD.

(Exact name of registrant as specified in its charter)

Bermuda

(State or other jurisdiction of incorporation or organization)

98-0374481

(I.R.S. Employer Identification No.)

Waterloo House, Ground Floor

100 Pitts Bay Road, Pembroke HM 08, Bermuda

(Address of principal executive offices)

(441) 278-9250

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Exchange Act:

Title of each class	Trading Symbol (s)	Name of each exchange on which registered	
Common shares, \$0.0011 par value per share	ACGL	NASDAQ	Stock Market
Depository shares, each representing a 1/1000th interest in a 5.25% Series E preferred share	ACGLP	NASDAQ	Stock Market
Depository shares, each representing a 1/1000th interest in a 5.45% Series F preferred share	ACGLO	NASDAQ	Stock Market

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large Accelerated Filer ☒ Accelerated Filer ☐ Non-accelerated Filer ☐ Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the Registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of May 1, 2020, there were 405,649,506 common shares, \$0.0011 par value per share, of the registrant outstanding.

ARCH CAPITAL GROUP LTD.**INDEX TO FORM 10-Q**

		Page No.
	PART I	
	Financial Information	2
Item 1.	Consolidated Financial Statements	4
Item 2.	Management's Discussion and Analysis of Financial Condition and Results of Operations	39
Item 3.	Quantitative and Qualitative Disclosures About Market Risk	62
Item 4.	Controls and Procedures	62
	PART II	
	Other Information	63
Item 1.	Legal Proceedings	63
Item 1A.	Risk Factors	63
Item 2.	Unregistered Sales of Equity Securities and Use of Proceeds	66
Item 3.	Defaults Upon Senior Securities	67
Item 4.	Mine Safety Disclosures	67
Item 5.	Other Information	67
Item 6.	Exhibits	68
	Signatures	69

PART I. FINANCIAL INFORMATION

Cautionary Note Regarding Forward-Looking Statements

The Private Securities Litigation Reform Act of 1995 (“PSLRA”) provides a “safe harbor” for forward-looking statements. This report or any other written or oral statements made by or on behalf of us may include forward-looking statements, which reflect our current views with respect to future events and financial performance. All statements other than statements of historical fact included in or incorporated by reference in this report are forward-looking statements. Forward-looking statements, for purposes of the PSLRA or otherwise, can generally be identified by the use of forward-looking terminology such as “may,” “will,” “expect,” “intend,” “estimate,” “anticipate,” “believe” or “continue” and similar statements of a future or forward-looking nature or their negative or variations or similar terminology.

Forward-looking statements involve our current assessment of risks and uncertainties. Actual events and results may differ materially from those expressed or implied in these statements. Important factors that could cause actual events or results to differ materially from those indicated in such statements are discussed below and elsewhere in this report and in our periodic reports filed with the Securities and Exchange Commission (the “SEC”), and include:

- our ability to successfully implement our business strategy during “soft” as well as “hard” markets;
- acceptance of our business strategy, security and financial condition by rating agencies and regulators, as well as by brokers and our insureds and reinsureds;
- the integration of any businesses we have acquired or may acquire into our existing operations;
- our ability to maintain or improve our ratings, which may be affected by our ability to raise additional equity or debt financings, by ratings agencies’ existing or new policies and practices, as well as other factors described herein;
- general economic and market conditions (including inflation, interest rates, unemployment, housing prices, foreign currency exchange rates, prevailing credit terms and the depth and duration of a recession, including those resulting from COVID-19) and conditions specific to the reinsurance and insurance markets (including the length and magnitude of the current “soft” market) in which we operate;
- competition, including increased competition, on the basis of pricing, capacity (including alternative sources of capital), coverage terms, or other factors;
- developments in the world’s financial and capital markets and our access to such markets;
- our ability to successfully enhance, integrate and maintain operating procedures (including information technology) to effectively support our current and new business;
- the loss of key personnel;
- accuracy of those estimates and judgments utilized in the preparation of our financial statements, including those related to revenue recognition, insurance and other reserves, reinsurance recoverables, investment valuations, intangible assets, bad debts, income taxes, contingencies and litigation, and any determination to use the deposit method of accounting;
- greater than expected loss ratios on business written by us and adverse development on claim and/or claim expense liabilities related to business written by our insurance and reinsurance subsidiaries;
- severity and/or frequency of losses;
- claims for natural or man-made catastrophic events or severe economic events in our insurance, reinsurance and mortgage businesses could cause large losses and substantial volatility in our results of operations;
- the effect of climate change on our business;
- acts of terrorism, political unrest and other hostilities or other unforecasted and unpredictable events;
- the effect of contagious disease (including COVID-19) on the Company’s business;
- availability to us of reinsurance to manage our gross and net exposures and the cost of such reinsurance;
- the failure of reinsurers, managing general agents, third party administrators or others to meet their obligations to us;
- the timing of loss payments being faster or the receipt of reinsurance recoverables being slower than anticipated by us;

- our investment performance, including legislative or regulatory developments that may adversely affect the fair value of our investments;
- changes in general economic conditions, including sovereign debt concerns or downgrades of U.S. securities by credit rating agencies, which could affect our business, financial condition and results of operations;
- changes in the method for determining the London Inter-bank Offered Rate (“LIBOR”) and the potential replacement of LIBOR;
- the volatility of our shareholders’ equity from foreign currency fluctuations, which could increase due to us not matching portions of our projected liabilities in foreign currencies with investments in the same currencies;
- changes in accounting principles or policies or in our application of such accounting principles or policies;
- changes in the political environment of certain countries in which we operate or underwrite business;
- a disruption caused by cyber-attacks or other technology breaches or failures on us or our business partners and service providers, which could negatively impact our business and/or expose us to litigation;
- statutory or regulatory developments, including as to tax matters and insurance and other regulatory matters such as the adoption of proposed legislation that would affect Bermuda-headquartered companies and/or Bermuda-based insurers or reinsurers and/or changes in regulations or tax laws applicable to us, our subsidiaries, brokers or customers, including the Tax Cuts and Jobs Act of 2017; and
- the other matters set forth under Item 1A “Risk Factors”, Item 7 “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and other sections of our Annual Report on Form 10-K for the year ended December 31, 2019, [“ITEM 1A—Risk Factors”](#) of this Form 10-Q as well as the other factors set forth in our other documents on file with the SEC, and management’s response to any of the aforementioned factors.

All subsequent written and oral forward-looking statements attributable to us or persons acting on our behalf are expressly qualified in their entirety by these cautionary statements. The foregoing review of important factors should not be construed as exhaustive and should be read in conjunction with other cautionary statements that are included herein or elsewhere. We undertake no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise.

ITEM 1. CONSOLIDATED FINANCIAL STATEMENTS

	Page No.
Report of Independent Registered Public Accounting Firm	5
Consolidated Balance Sheets March 31, 2020 (unaudited) and December 31, 2019	6
Consolidated Statements of Income For the three month periods ended March 31, 2020 and 2019 (unaudited)	7
Consolidated Statements of Comprehensive Income For the three month periods ended March 31, 2020 and 2019 (unaudited)	8
Consolidated Statements of Changes in Shareholders' Equity For the three month periods ended March 31, 2020 and 2019 (unaudited)	9
Consolidated Statements of Cash Flows For the three month periods ended March 31, 2020 and 2019 (unaudited)	10
Notes to Consolidated Financial Statements (unaudited)	
Note 1 - Basis of Presentation and Recent Accounting Pronouncements	11
Note 2 - Share Transactions	13
Note 3 - Earnings Per Common Share	14
Note 4 - Segment Information	15
Note 5 - Reserve for Losses and Loss Adjustment Expenses	18
Note 6 - Allowance for Expected Credit Losses	20
Note 7 - Investment Information	21
Note 8 - Fair Value	27
Note 9 - Derivative Instruments	33
Note 10 - Commitments and Contingencies	34
Note 11 - Leases	34
Note 12 - Variable Interest Entities and Noncontrolling Interests	34
Note 13 - Other Comprehensive Income (Loss)	37
Note 14 - Income Taxes	38
Note 15 - Legal Proceedings	38
Note 16 - Transactions with Related Parties	38

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Arch Capital Group Ltd.

Results of Review of Interim Financial Statements

We have reviewed the accompanying consolidated balance sheet of Arch Capital Group Ltd. and its subsidiaries (the “Company”) as of March 31, 2020, and the related consolidated statements of income, comprehensive income, changes in shareholders’ equity, and cash flows for the three-month periods ended March 31, 2020 and 2019, including the related notes (collectively referred to as the “interim financial statements”). Based on our reviews, we are not aware of any material modifications that should be made to the accompanying interim financial statements for them to be in conformity with accounting principles generally accepted in the United States of America.

We have previously audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheet of the Company as of December 31, 2019, and the related consolidated statements of income, comprehensive income, changes in shareholders’ equity, and cash flows for the year then ended (not presented herein), and in our report dated February 28, 2020, we expressed an unqualified opinion on those consolidated financial statements. In our opinion, the information set forth in the accompanying consolidated balance sheet as of December 31, 2019, is fairly stated, in all material respects, in relation to the consolidated balance sheet from which it has been derived.

Basis for Review Results

These interim financial statements are the responsibility of the Company’s management. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB. We conducted our review in accordance with the standards of the PCAOB. A review of interim financial information consists principally of applying analytical procedures and making inquiries of persons responsible for financial and accounting matters. It is substantially less in scope than an audit conducted in accordance with the standards of the PCAOB, the objective of which is the expression of an opinion regarding the financial statements taken as a whole. Accordingly, we do not express such an opinion.

/s/ PricewaterhouseCoopers LLP

New York, NY
May 8, 2020

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(U.S. dollars in thousands, except share data)

	(Unaudited)	
	March 31, 2020	December 31, 2019
Assets		
Investments:		
Fixed maturities available for sale, at fair value (amortized cost: \$16,757,086 and \$16,598,808); net of allowance for credit losses: \$9,909 at March 31, 2020)	\$ 16,841,571	\$ 16,894,526
Short-term investments available for sale, at fair value (amortized cost: \$944,878 and \$957,283); net of allowance for credit losses: \$29 at March 31, 2020)	944,531	956,546
Collateral received under securities lending, at fair value (amortized cost: \$182,274 and \$388,366)	182,284	388,376
Equity securities, at fair value	1,181,903	838,925
Investments accounted for using the fair value option	3,310,517	3,663,477
Investments accounted for using the equity method	1,676,055	1,660,396
Total investments	24,136,861	24,402,246
Cash	882,284	726,230
Accrued investment income	118,089	117,937
Securities pledged under securities lending, at fair value (amortized cost: \$175,218 and \$378,738)	177,442	379,868
Premiums receivable (net of allowance for credit losses: \$27,990 and \$21,003)	2,155,204	1,778,717
Reinsurance recoverable on unpaid and paid losses and loss adjustment expenses (net of allowance for credit losses: \$13,700 and \$1,364)	4,303,135	4,346,816
Contractholder receivables (net of allowance for credit losses: \$9,038 and \$0)	2,140,724	2,119,460
Ceded unearned premiums	1,357,284	1,234,683
Deferred acquisition costs	708,848	633,400
Receivable for securities sold	221,573	24,133
Goodwill and intangible assets	705,450	738,083
Other assets	1,509,232	1,383,788
Total assets	\$ 38,416,126	\$ 37,885,361
Liabilities		
Reserve for losses and loss adjustment expenses	\$ 14,309,580	\$ 13,891,842
Unearned premiums	4,817,191	4,339,549
Reinsurance balances payable	737,597	667,072
Contractholder payables	2,149,762	2,119,460
Collateral held for insured obligations	211,597	206,698
Senior notes	1,871,869	1,871,626
Revolving credit agreement borrowings	500,587	484,287
Securities lending payable	182,274	388,366
Payable for securities purchased	327,359	87,579
Other liabilities	1,392,905	1,513,330
Total liabilities	26,500,721	25,569,809
Commitments and Contingencies		
Redeemable noncontrolling interests	55,376	55,404
Shareholders' Equity		
Non-cumulative preferred shares	780,000	780,000
Common shares (\$0.0011 par, shares issued: 577,386,799 and 574,617,195)	642	638
Additional paid-in capital	1,921,487	1,889,683
Retained earnings	11,132,268	11,021,006
Accumulated other comprehensive income (loss), net of deferred income tax	21,944	212,091
Common shares held in treasury, at cost (shares: 171,776,932 and 168,997,994)	(2,489,097)	(2,406,047)
Total shareholders' equity available to Arch	11,367,244	11,497,371
Non-redeemable noncontrolling interests	492,785	762,777

Total shareholders' equity	<u>11,860,029</u>	<u>12,260,148</u>
Total liabilities, noncontrolling interests and shareholders' equity	<u>\$ 38,416,126</u>	<u>\$ 37,885,361</u>

See Notes to Consolidated Financial Statements

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF INCOME
(U.S. dollars in thousands, except share data)

	(Unaudited)	
	Three Months Ended	
	March 31,	
	2020	2019
Revenues		
Net premiums written	\$ 2,137,246	\$ 1,525,259
Change in unearned premiums	(392,802)	(156,393)
Net premiums earned	1,744,444	1,368,866
Net investment income	145,153	156,949
Net realized gains (losses)	(366,960)	140,256
Other underwriting income	6,852	8,825
Equity in net income (loss) of investment funds accounted for using the equity method	(4,209)	46,867
Other income	8,548	1,083
Total revenues	1,533,828	1,722,846
Expenses		
Losses and loss adjustment expenses	1,115,419	718,532
Acquisition expenses	247,283	197,848
Other operating expenses	234,544	201,163
Corporate expenses	20,796	17,962
Amortization of intangible assets	16,631	20,417
Interest expense	32,555	29,065
Net foreign exchange (gains) losses	(72,671)	(3,525)
Total expenses	1,594,557	1,181,462
Income (loss) before income taxes	(60,729)	541,384
Income tax expense	(27,945)	(45,886)
Net income (loss)	\$ (88,674)	\$ 495,498
Net (income) loss attributable to noncontrolling interests	232,791	(46,970)
Net income available to Arch	144,117	448,528
Preferred dividends	(10,403)	(10,403)
Net income available to Arch common shareholders	\$ 133,714	\$ 438,125
Net income per common share and common share equivalent		
Basic	\$ 0.33	\$ 1.09
Diluted	\$ 0.32	\$ 1.07
Weighted average common shares and common share equivalents outstanding		
Basic	403,892,161	400,184,404
Diluted	414,033,570	408,971,029

See Notes to Consolidated Financial Statements

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(U.S. dollars in thousands)

	(Unaudited)	
	Three Months Ended	
	March 31,	
	2020	2019
Comprehensive Income		
Net income (loss)	\$ (88,674)	\$ 495,498
Other comprehensive income (loss), net of deferred income tax		
Unrealized appreciation (decline) in value of available-for-sale investments:		
Unrealized holding gains (losses) arising during period	(57,287)	225,887
Reclassification of net realized (gains) losses, included in net income (loss)	(121,229)	(10,221)
Foreign currency translation adjustments	(44,689)	5,516
Comprehensive income (loss)	(311,879)	716,680
Net (income) loss attributable to noncontrolling interests	232,791	(46,970)
Other comprehensive (income) loss attributable to noncontrolling interests	33,058	(4,139)
Comprehensive income (loss) available to Arch	<u>\$ (46,030)</u>	<u>\$ 665,571</u>

See Notes to Consolidated Financial Statements

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY
(U.S. dollars in thousands)

	(Unaudited)	
	Three Months Ended	
	March 31,	
	2020	2019
Non-cumulative preferred shares		
Balance at beginning and end of period	780,000	780,000
Common shares		
Balance at beginning of period	638	634
Common shares issued, net	4	2
Balance at end of period	642	636
Additional paid-in capital		
Balance at beginning of period	1,889,683	1,793,781
Amortization of share-based compensation	28,602	25,908
Other changes	3,202	(84)
Balance at end of period	1,921,487	1,819,605
Retained earnings		
Balance at beginning of period	11,021,006	9,426,299
Cumulative effect of an accounting change (1)	(22,452)	—
Balance at beginning of period, as adjusted	10,998,554	9,426,299
Net income (loss)	(88,674)	495,498
Net (income) loss attributable to noncontrolling interests	232,791	(46,970)
Preferred share dividends	(10,403)	(10,403)
Balance at end of period	11,132,268	9,864,424
Accumulated other comprehensive income (loss), net of deferred income tax		
Balance at beginning of period	212,091	(178,720)
Unrealized appreciation (decline) in value of available-for-sale investments, net of deferred income tax:		
Balance at beginning of period	258,486	(114,178)
Unrealized holding gains (losses) during period, net of reclassification adjustment	(178,516)	215,666
Unrealized holding gains (losses) during period attributable to noncontrolling interests	33,179	(4,286)
Balance at end of period	113,149	97,202
Foreign currency translation adjustments, net of deferred income tax:		
Balance at beginning of period	(46,395)	(64,542)
Foreign currency translation adjustments	(44,689)	5,516
Foreign currency translation adjustments attributable to noncontrolling interests	(121)	147
Balance at end of period	(91,205)	(58,879)
Balance at end of period	21,944	38,323
Common shares held in treasury, at cost		
Balance at beginning of period	(2,406,047)	(2,382,167)
Shares repurchased for treasury	(83,050)	(6,225)
Balance at end of period	(2,489,097)	(2,388,392)
Total shareholders' equity available to Arch	11,367,244	10,114,596
Non-redeemable noncontrolling interests	492,785	838,081
Total shareholders' equity	\$ 11,860,029	\$ 10,952,677

(1) Adoption of ASU 2016-13, "Financial Instruments - Credit Losses (Topic 326)" See [note 1](#).

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(U.S. dollars in thousands)

	(Unaudited) Three Months Ended March 31,	
	2020	2019
Operating Activities		
Net income (loss)	\$ (88,674)	\$ 495,498
Adjustments to reconcile net income (loss) to net cash provided by operating activities:		
Net realized (gains) losses	362,964	(144,091)
Equity in net income or loss of investment funds accounted for using the equity method and other income or loss	29,034	(29,752)
Amortization of intangible assets	16,631	20,417
Share-based compensation	28,549	25,891
Changes in:		
Reserve for losses and loss adjustment expenses, net of unpaid losses and loss adjustment expenses recoverable	506,057	(6,005)
Unearned premiums, net of ceded unearned premiums	392,802	156,393
Premiums receivable	(418,457)	(285,137)
Deferred acquisition costs	(75,135)	(23,168)
Reinsurance balances payable	79,807	62,605
Other items, net	(223,124)	(37,253)
Net cash provided by (used for) operating activities	610,454	235,398
Investing Activities		
Purchases of fixed maturity investments	(11,965,995)	(7,444,470)
Purchases of equity securities	(760,683)	(203,810)
Purchases of other investments	(228,471)	(324,593)
Proceeds from sales of fixed maturity investments	11,723,123	7,076,590
Proceeds from sales of equity securities	266,301	95,017
Proceeds from sales, redemptions and maturities of other investments	216,131	216,483
Proceeds from redemptions and maturities of fixed maturity investments	198,356	100,424
Net settlements of derivative instruments	195,488	29,737
Net (purchases) sales of short-term investments	(11,777)	292,601
Change in cash collateral related to securities lending	55,001	(29,618)
Purchases of fixed assets	(8,470)	(9,423)
Other	42,500	(93,731)
Net cash provided by (used for) investing activities	(278,496)	(294,793)
Financing Activities		
Purchases of common shares under share repurchase program	(75,486)	(2,871)
Proceeds from common shares issued, net	(4,527)	(1,901)
Proceeds from borrowings	16,300	59,000
Repayments of borrowings	—	(26,038)
Change in cash collateral related to securities lending	(55,001)	29,618
Third party investment in non-redeemable noncontrolling interests	(2,867)	—
Dividends paid to redeemable noncontrolling interests	(1,181)	(4,497)
Other	(1,331)	(1,389)
Preferred dividends paid	(10,403)	(10,403)
Net cash provided by (used for) financing activities	(134,496)	41,519
Effects of exchange rate changes on foreign currency cash and restricted cash	(30,723)	3,449
Increase (decrease) in cash and restricted cash	166,739	(14,427)
Cash and restricted cash, beginning of year	903,698	724,643
Cash and restricted cash, end of period	\$ 1,070,437	\$ 710,216

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

1. Basis of Presentation and Recent Accounting Pronouncements

General

Arch Capital Group Ltd. (“Arch Capital”) is a Bermuda public limited liability company which provides insurance, reinsurance and mortgage insurance on a worldwide basis through its wholly-owned subsidiaries. As used herein, the “Company” means Arch Capital and its subsidiaries. The Company’s consolidated financial statements include the results of Watford Holdings Ltd. and its wholly owned subsidiaries (“Watford”). Watford is a multi-line Bermuda reinsurance company. Watford’s own management and board of directors are responsible for its results and profitability. See [note 12](#).

Basis of Presentation

The interim consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America (“GAAP”). All significant intercompany transactions and balances have been eliminated in consolidation. The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ materially from those estimates and assumptions. In the opinion of management, the accompanying unaudited interim consolidated financial statements reflect all adjustments (consisting of normally recurring accruals) necessary for a fair statement of results on an interim basis. The results of any interim period are not necessarily indicative of the results for a full year or any future periods.

Certain information and footnote disclosures normally included in financial statements prepared in accordance with GAAP have been condensed or omitted; however, management believes that the disclosures are adequate to make the information presented not misleading. This report should be read in conjunction with the Company’s Annual Report on Form 10-K for the year ended December 31, 2019 (“2019 Form 10-K”), including the Company’s audited consolidated financial statements and related notes.

The Company has reclassified the presentation of certain prior year information to conform to the current presentation. Such reclassifications had no effect on the Company’s net income, comprehensive income, shareholders’ equity or cash flows. Tabular amounts are in U.S. Dollars in thousands, except share amounts, unless otherwise noted.

Recent Accounting Pronouncements

Recently Issued Accounting Standards Adopted

The Company adopted ASU 2018-13, “Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement,” which was issued in August, 2018. The ASU modifies the disclosure requirements on fair value measurement as part of the disclosure framework project with the objective to improve the effectiveness of disclosures in the notes to the financial statements. The amendments in this update allow for removal of (1) the amount and reasons for transfer between Level 1 and Level 2 of the fair value hierarchy; (2) the policy for transfers between levels; and (3) the valuation processes for Level 3 fair value measurements. The ASU is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal years. The adoption of this guidance did not have a material effect on the Company’s consolidated financial statements.

The Company adopted ASU 2018-15, “Intangibles - Goodwill and Other - Internal Use Software (Subtopic 350-40),” which was issued in the 2018 third quarter. This ASU aligns the requirements for capitalizing certain implementation costs incurred in a cloud computing arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. The standard is effective for financial statements issued for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019, with early adoption permitted. The guidance provides flexibility in adoption, allowing for either retrospective adjustment or prospective adjustment for all implementation costs incurred after the date of adoption. The Company adopted this guidance prospectively, which did not have a material effect on the Company’s consolidated financial statements.

In March 2020, the SEC amended Rule 3-10 of Regulation S-X regarding financial disclosure requirements for registered debt offerings involving subsidiaries as either issuers or guarantors and affiliates whose securities are pledged as collateral. This new guidance narrows the circumstances that require separate financial statements of subsidiary issuers and guarantors and streamlines the alternative disclosures required in lieu of those statements. The amendment is effective on January 4, 2021 with early adoption permitted. The Company elected to apply the amended requirements for the quarter ended March 31, 2020, and is no longer providing condensed consolidating financial information that resulted from the registered debt obligations of its subsidiaries, Arch Capital Group (US) Inc. and Arch Capital Finance LLC. that were disclosed in Note 26 of the financial statements in the Company’s 2019 Form 10-K.

The Company adopted ASU 2016-13, “Financial Instruments - Credit Losses (Topic 326),” which was issued in June 2016.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The ASU applies a new credit loss model (current expected credit losses) for determining credit related impairments for financial instruments measured at amortized cost, including reinsurance recoverable, contractholder receivables, and premiums receivable, and requires an entity to estimate its lifetime “expected credit loss” and record an allowance that, when deducted from the amortized cost basis of the financial asset, presents the net amount expected to be collected on the financial asset. The estimate of expected credit losses should consider historical information, current information, as well as reasonable and supportable forecasts, including estimates of prepayments.

The ASU also amends the previous other-than-temporary impairment model for available-for-sale debt securities by requiring the recognition of impairments relating to credit losses through an allowance account and limits the amount of credit loss to the difference between a security’s amortized cost basis and its fair value. In addition, the length of time a security has been in an unrealized loss position will no longer impact the determination of whether a credit loss exists.

The Company adopted the ASU for the quarter ending March 31, 2020 by recognizing an after-tax cumulative effect adjustment of \$22.5 million to the opening balance of retained earnings as of January 1, 2020. The cumulative effect adjustment decreased retained earnings and increased the allowance for credit losses.

Significant Accounting Policies

The following accounting policies have been updated to reflect the Company’s adoption of the new accounting guidance on credit losses.

Investments

The Company conducts a periodic review to identify and evaluate credit based impairments related to the Company’s available for sale investments. The Company derives estimated credit losses by comparing expected future cash flows to be collected to the amortized cost of the security. Estimates of expected future cash flows consider among other things, macroeconomic conditions as well as the financial condition, near-term and long-term prospects for the issuer, and the likelihood of the recoverability of principal and interest. Effective January 1, 2020, credit losses are recognized through an allowance account subject to reversal, rather than a reduction in amortized cost. Declines in value attributable to factors other than credit are reported in other comprehensive income while the allowance for credit loss is charged to net realized gains (losses).

For available for sale investments that the Company intends to sell or for which it is more likely than not that the Company would be required to sell before an anticipated recovery in value, the full amount of the impairment is included in net

realized gains (losses). The new cost basis of the investment is the previous amortized cost basis reduced by the impairment recognized in net realized gains (losses). The new cost basis is not adjusted for any subsequent recoveries in fair value.

The Company reports accrued investment income separately from investment balances and has elected not to measure an allowance for credit losses for accrued investment income. Any uncollectible accrued interest income is written off in the period it is deemed uncollectible.

Reinsurance Recoverables

In the normal course of business, the Company’s subsidiaries cede a portion of their premium and losses through pro rata and excess of loss reinsurance agreements on a treaty or facultative basis. Reinsurance recoverables are recorded as assets, predicated on the reinsurers’ ability to meet their obligations under the reinsurance agreements. In certain instances, the Company obtains collateral, including letters of credit and trust accounts to further reduce the credit exposure on its reinsurance recoverables. The Company reports its reinsurance recoverables net of an allowance for expected credit loss. The allowance is based upon the Company’s ongoing review of amounts outstanding, the financial condition of its reinsurers, amounts and form of collateral obtained and other relevant factors. A ratings based probability-of-default and loss-given-default methodology is used to estimate the allowance for expected credit loss. Any allowance for credit losses is charged to net realized gains (losses) in the period the recoverable is recorded and revised in subsequent periods to reflect changes in the Company’s estimate of expected credit losses.

Contractholder Receivables

Certain insurance policies written by the Company’s U.S. insurance operations feature large deductibles, primarily in its construction and national accounts line of business. Under such contracts, the Company is obligated to pay the claimant for the full amount of the claim. The Company is subsequently reimbursed by the policy holder for the deductible amount. These amounts are included on a gross basis in the consolidated balance sheet as contractholder payables and contractholder receivables. In the event that the Company is unable to collect from the policyholder, the Company would be liable for such defaulted amounts. Collateral, primarily in the form of letters of credit, cash and trusts, is obtained from the policyholder to mitigate the Company’s credit risk.

Contractholder receivables are reported net of an allowance for expected credit losses. The allowance is based upon the Company’s ongoing review of amounts outstanding, changes in policyholder credit standing, amounts and form of collateral obtained, and other relevant factors. A ratings based probability-of-default and loss-given-default methodology is used to estimate the allowance for expected credit losses. Any allowance for credit losses is charged to net realized gains

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

(losses) in the period the receivable is recorded and revised in subsequent periods to reflect changes in the Company's estimate of expected credit losses.

Premiums Receivable

Premiums receivable include amounts receivable from agents, brokers and insured that are both currently due and amounts not yet due on insurance, reinsurance and mortgage insurance policies. Premiums receivable balances are reported net of an allowance for expected credit losses. The Company monitors credit risk associated with premiums receivable through its ongoing review of amounts outstanding, aging of the receivable, historical loss data, and counterparty financial strength measures. The allowance also includes estimated uncollectible amounts related to dispute risk. Amounts deemed to be uncollectible are written off against the allowance. In certain instances, credit risk may be reduced by the Company's right to offset loss obligations or unearned premiums against premiums receivable. Any allowance for credit losses is charged to net realized gains (losses) in the period the receivable is recorded and revised in subsequent periods to reflect changes in the Company's estimate of expected credit losses.

Recently Issued Accounting Standards Not Yet Adopted

In March 2020, the FASB issued ASU 2020-04, "Facilitation of the Effects of Reference Rate Reform on Financial Reporting." This ASU provides optional expedients and exceptions for applying GAAP to investments, derivatives, or other transactions that reference the London Interbank Offered Rate (LIBOR) or another reference rate expected to be discontinued because of reference rate reform. Along with the optional expedients, the amendments include a general principle that permits an entity to consider contract modifications due to reference reform to be an event that does not require contract re-measurement at the modification date or reassessment of a previous accounting determination. Additionally, a company may make a one-time election to sell, transfer, or both sell and transfer debt securities classified as held to maturity that reference a rate affected by reference rate reform and that were classified as held to maturity before January 1, 2020. This standard may be elected over time through December 31, 2022 as reference rate reform activities occur. We are currently assessing the effect of adopting this guidance on our financial condition and results of operations.

For information regarding additional accounting standards that the Company has not yet adopted, see note 3(r), "Significant Accounting Policies—Recent Accounting Pronouncements," of the notes to consolidated financial statements in the Company's 2019 Form 10-K.

2. Share Transactions

Share-Based Compensation

During the 2020 first quarter, the Company granted 1,116,073 stock options, 557,204 performance share awards ("PSAs") and units ("PSUs") and 910,879 restricted shares and units to certain employees. The stock options were valued at the grant date using the Black-Scholes option pricing model. The weighted average grant-date fair value of the stock options, PSAs/PSUs and restricted shares and units granted during the 2020 first quarter were approximately \$8.14, \$44.17 and \$42.36 per share, respectively. Such values are being amortized over the respective substantive vesting period.

During the 2019 first quarter, the Company granted 1,182,264 stock options, 672,768 PSAs and PSUs and 1,099,125 restricted shares and units to certain employees. The stock options were valued at the grant date using the Black-Scholes option pricing model. The weighted average grant-date fair value of the stock options, PSAs/PSUs and restricted shares and units granted during the 2019 first quarter were approximately \$7.90, \$35.83 and \$32.64 per share, respectively. Such values are being amortized over the respective substantive vesting period.

Share Repurchases

The board of directors of Arch Capital has authorized the investment in Arch Capital's common shares through a share repurchase program. Since the inception of the share repurchase program, Arch Capital has repurchased 388.9 million common shares for an aggregate purchase price of \$4.04 billion. For the three months ended March 31, 2020, Arch Capital repurchased 2.6 million shares under the share repurchase program with an aggregate purchase price of \$75.5 million. Arch Capital repurchased 0.1 million shares under the share repurchase program with an aggregate purchase price of \$2.9 million during the three months ended March 31, 2019. At March 31, 2020, \$924.5 million of share repurchases were available under the program, which may be effected from time to time in open market or privately negotiated transactions through December 31, 2021. The timing and amount of the repurchase transactions under this program will depend on a variety of factors, including market conditions and corporate and regulatory considerations.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

3. Earnings Per Common Share

The following table sets forth the computation of basic and diluted earnings per common share:

	Three Months Ended	
	March 31,	
	2020	2019
Numerator:		
Net income (loss)	\$ (88,674)	\$ 495,498
Amounts attributable to noncontrolling interests	232,791	(46,970)
Net income available to Arch	144,117	448,528
Preferred dividends	(10,403)	(10,403)
Net income available to Arch common shareholders	\$ 133,714	\$ 438,125
Denominator:		
Weighted average common shares and common share equivalents outstanding — basic	403,892,161	400,184,404
Effect of dilutive common share equivalents:		
Nonvested restricted shares	2,275,473	1,807,488
Stock options (1)	7,865,936	6,979,137
Weighted average common shares and common share equivalents outstanding — diluted	414,033,570	408,971,029
Earnings per common share:		
Basic	\$ 0.33	\$ 1.09
Diluted	\$ 0.32	\$ 1.07

- (1) Certain stock options were not included in the computation of diluted earnings per share where the exercise price of the stock options exceeded the average market price and would have been anti-dilutive or where, when applying the treasury stock method to in-the-money options, the sum of the proceeds, including unrecognized compensation, exceeded the average market price and would have been anti-dilutive. For the 2020 first quarter and 2019 first quarter, the number of stock options excluded were 1,155,088 and 5,577,724, respectively.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

4. Segment Information

The Company classifies its businesses into three underwriting segments — insurance, reinsurance and mortgage — and two other operating segments — ‘other’ and corporate (non-underwriting). The Company determined its reportable segments using the management approach described in accounting guidance regarding disclosures about segments of an enterprise and related information. The accounting policies of the segments are the same as those used for the preparation of the Company’s consolidated financial statements. Intersegment business is allocated to the segment accountable for the underwriting results.

The Company’s insurance, reinsurance and mortgage segments each have managers who are responsible for the overall profitability of their respective segments and who are directly accountable to the Company’s chief operating decision makers, the President and Chief Executive Officer of Arch Capital, and the Chief Financial Officer of Arch Capital. The chief operating decision makers do not assess performance, measure return on equity or make resource allocation decisions on a line of business basis. Management measures segment performance for its three underwriting segments based on underwriting income or loss. The Company does not manage its assets by underwriting segment, with the exception of goodwill and intangible assets, and, accordingly, investment income is not allocated to each underwriting segment.

The insurance segment consists of the Company’s insurance underwriting units which offer specialty product lines on a worldwide basis. Product lines include: construction and national accounts; excess and surplus casualty; lenders products; professional lines; programs; property, energy, marine and aviation; travel, accident and health; and other (consisting of alternative markets, excess workers' compensation and surety business).

The reinsurance segment consists of the Company’s reinsurance underwriting units which offer specialty product lines on a worldwide basis. Product lines include: casualty; marine and aviation; other specialty; property catastrophe; property excluding property catastrophe (losses on a single risk, both excess of loss and pro rata); and other (consisting of life reinsurance, casualty clash and other).

The mortgage segment includes the Company’s U.S. and international mortgage insurance and reinsurance operations as well as government sponsored enterprise (“GSE”) credit-risk sharing transactions. Arch Mortgage Insurance Company and United Guaranty Residential Insurance Company (combined “Arch MI U.S.”) are approved as eligible mortgage insurers by Federal National Mortgage Association (“Fannie Mae”) and Federal Home Loan Mortgage Corporation (“Freddie Mac”), each a GSE.

The corporate (non-underwriting) segment results include net investment income, other income (loss), corporate expenses, transaction costs and other, interest expense, items related to the Company’s non-cumulative preferred shares, net realized gains or losses (which includes changes in the allowance for credit losses on financial assets and net impairment losses recognized in earnings), equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses and income taxes. Such amounts exclude the results of the ‘other’ segment.

The ‘other’ segment includes the results of Watford (see [note 12](#)). For the ‘other’ segment, performance is measured based on net income or loss.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following tables summarize the Company's underwriting income or loss by segment, together with a reconciliation of underwriting income or loss to net income available to Arch common shareholders:

	Three Months Ended					
	March 31, 2020					
	Insurance	Reinsurance	Mortgage	Sub-Total	Other	Total
Gross premiums written (1)	\$ 1,207,645	\$ 1,122,519	\$ 368,945	\$ 2,698,537	\$ 234,902	\$ 2,832,830
Premiums ceded	(378,897)	(325,339)	(44,327)	(747,991)	(48,202)	(695,584)
Net premiums written	828,748	797,180	324,618	1,950,546	186,700	2,137,246
Change in unearned premiums	(112,829)	(253,720)	20,408	(346,141)	(46,661)	(392,802)
Net premiums earned	715,919	543,460	345,026	1,604,405	140,039	1,744,444
Other underwriting income (loss)	—	2,120	4,599	6,719	133	6,852
Losses and loss adjustment expenses	(507,108)	(430,069)	(67,566)	(1,004,743)	(110,676)	(1,115,419)
Acquisition expenses	(107,337)	(79,606)	(38,536)	(225,479)	(21,804)	(247,283)
Other operating expenses	(129,649)	(45,297)	(45,896)	(220,842)	(13,702)	(234,544)
Underwriting income (loss)	\$ (28,175)	\$ (9,392)	\$ 197,627	160,060	(6,010)	154,050
Net investment income				113,028	32,125	145,153
Net realized gains (losses)				(72,109)	(294,851)	(366,960)
Equity in net income (loss) of investment funds accounted for using the equity method				(4,209)	—	(4,209)
Other income (loss)				8,548	—	8,548
Corporate expenses (2)				(18,201)	—	(18,201)
Transaction costs and other (2)				(2,595)	—	(2,595)
Amortization of intangible assets				(16,631)	—	(16,631)
Interest expense				(25,245)	(7,310)	(32,555)
Net foreign exchange gains (losses)				63,307	9,364	72,671
Income (loss) before income taxes				205,953	(266,682)	(60,729)
Income tax expense				(27,945)	—	(27,945)
Net income (loss)				178,008	(266,682)	(88,674)
Amounts attributable to redeemable noncontrolling interests				(57)	(1,096)	(1,153)
Amounts attributable to nonredeemable noncontrolling interests				—	233,944	233,944
Net income (loss) available to Arch				177,951	(33,834)	144,117
Preferred dividends				(10,403)	—	(10,403)
Net income (loss) available to Arch common shareholders				\$ 167,548	\$ (33,834)	\$ 133,714
Underwriting Ratios						
Loss ratio	70.8%	79.1%	19.6%	62.6%	79.0%	63.9%
Acquisition expense ratio	15.0%	14.6%	11.2%	14.1%	15.6%	14.2%
Other operating expense ratio	18.1%	8.3%	13.3%	13.8%	9.8%	13.4%
Combined ratio	103.9%	102.0%	44.1%	90.5%	104.4%	91.5%
Goodwill and intangible assets	\$ 268,296	\$ 2,516	\$ 426,988	\$ 697,800	\$ 7,650	\$ 705,450

- (1) Certain amounts included in the gross premiums written of each segment are related to intersegment transactions. Accordingly, the sum of gross premiums written for each segment does not agree to the total gross premiums written as shown in the table above due to the elimination of intersegment transactions in the total.
- (2) Certain expenses have been excluded from 'corporate expenses' and reflected in 'transaction costs and other.'

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

Three Months Ended March 31, 2019						
	Insurance	Reinsurance	Mortgage	Sub-Total	Other	Total
Gross premiums written (1)	\$ 941,954	\$ 682,855	\$ 356,050	\$ 1,980,453	\$ 186,689	\$ 2,077,879
Premiums ceded	(320,622)	(231,567)	(48,798)	(600,581)	(41,302)	(552,620)
Net premiums written	621,332	451,288	307,252	1,379,872	145,387	1,525,259
Change in unearned premiums	(67,827)	(104,923)	15,650	(157,100)	707	(156,393)
Net premiums earned	553,505	346,365	322,902	1,222,772	146,094	1,368,866
Other underwriting income (loss)	—	4,377	3,856	8,233	592	8,825
Losses and loss adjustment expenses	(356,723)	(239,810)	(11,149)	(607,682)	(110,850)	(718,532)
Acquisition expenses	(82,824)	(54,326)	(31,672)	(168,822)	(29,026)	(197,848)
Other operating expenses	(113,396)	(35,704)	(39,875)	(188,975)	(12,188)	(201,163)
Underwriting income (loss)	\$ 562	\$ 20,902	\$ 244,062	265,526	(5,378)	260,148
Net investment income				121,249	35,700	156,949
Net realized gains (losses)				111,124	29,132	140,256
Equity in net income (loss) of investment funds accounted for using the equity method				46,867	—	46,867
Other income (loss)				1,083	—	1,083
Corporate expenses (2)				(16,772)	—	(16,772)
Transaction costs and other (2)				(1,190)	—	(1,190)
Amortization of intangible assets				(20,417)	—	(20,417)
Interest expense				(23,482)	(5,583)	(29,065)
Net foreign exchange gains (losses)				5,175	(1,650)	3,525
Income before income taxes				489,163	52,221	541,384
Income tax expense				(45,886)	—	(45,886)
Net income				443,277	52,221	495,498
Amounts attributable to redeemable noncontrolling interests				—	(4,588)	(4,588)
Amounts attributable to nonredeemable noncontrolling interests				—	(42,382)	(42,382)
Net income available to Arch				443,277	5,251	448,528
Preferred dividends				(10,403)	—	(10,403)
Net income available to Arch common shareholders				\$ 432,874	\$ 5,251	\$ 438,125
Underwriting Ratios						
Loss ratio	64.4%	69.2%	3.5%	49.7%	75.9%	52.5%
Acquisition expense ratio	15.0%	15.7%	9.8%	13.8%	19.9%	14.5%
Other operating expense ratio	20.5%	10.3%	12.3%	15.5%	8.3%	14.7%
Combined ratio	99.9%	95.2%	25.6%	79.0%	104.1%	81.7%
Goodwill and intangible assets	\$ 156,735	\$ —	\$ 494,830	\$ 651,565	\$ 7,650	\$ 659,215

- (1) Certain amounts included in the gross premiums written of each segment are related to intersegment transactions. Accordingly, the sum of gross premiums written for each segment does not agree to the total gross premiums written as shown in the table above due to the elimination of intersegment transactions in the total.
- (2) Certain expenses have been excluded from 'corporate expenses' and reflected in 'transaction costs and other.'

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

5. Reserve for Losses and Loss Adjustment Expenses

The following table represents an analysis of losses and loss adjustment expenses and a reconciliation of the beginning and ending reserve for losses and loss adjustment expenses:

	Three Months Ended	
	March 31,	
	2020	2019
Reserve for losses and loss adjustment expenses at beginning of period	\$ 13,891,842	\$ 11,853,297
Unpaid losses and loss adjustment expenses recoverable	4,082,650	2,814,291
Net reserve for losses and loss adjustment expenses at beginning of period	9,809,192	9,039,006
Net incurred losses and loss adjustment expenses relating to losses occurring in:		
Current year	1,134,442	757,964
Prior years	(19,023)	(39,432)
Total net incurred losses and loss adjustment expenses	1,115,419	718,532
Retroactive reinsurance transactions (1)	60,635	(225,500)
Net foreign exchange (gains) losses and other	(142,573)	(504)
Net paid losses and loss adjustment expenses relating to losses occurring in:		
Current year	(41,260)	(64,340)
Prior years	(561,947)	(427,312)
Total net paid losses and loss adjustment expenses	(603,207)	(491,652)
Net reserve for losses and loss adjustment expenses at end of period	10,239,466	9,039,882
Unpaid losses and loss adjustment expenses recoverable	4,070,114	2,970,159
Reserve for losses and loss adjustment expenses at end of period	\$ 14,309,580	\$ 12,010,041

- (1) During 2020 first quarter, a subsidiary of the Company entered into a reinsurance to close agreement of the 2017 and prior years of account previously covered by a third party arrangement, while in the 2019 first quarter, a subsidiary of the Company entered into a retroactive reinsurance transaction with third party reinsurer to reinsure run-off liabilities associated with certain U.S. insurance exposures.

Development on Prior Year Loss Reserves

2020 First Quarter

During the 2020 first quarter, the Company recorded net favorable development on prior year loss reserves of \$19.0 million, which consisted of \$1.1 million of favorable development from the insurance segment, \$11.6 million from the reinsurance segment, \$6.1 million from the mortgage segment and \$0.2 million from the 'other' segment.

The insurance segment's net favorable development of \$1.1 million, or 0.2 loss ratio points, for the 2020 first quarter consisted of \$3.9 million of net favorable development in short-tailed lines, \$7.9 million of net adverse development in medium-tailed lines and \$5.2 million of net favorable development in long-tailed lines. Net favorable development in short-tailed lines primarily resulted from lenders products and property (including special risk other than marine) reserves across 2018 and prior accident years (*i.e.*, the year in which a loss occurred). Net adverse development in medium-tailed lines included \$13.2 million of adverse development in contract binding business across most accident years, partially offset by

\$5.1 million of favorable development in professional liability business. Net favorable development in longer-tailed lines primarily related to construction business driven by the 2017 accident year.

The reinsurance segment's net favorable development of \$11.6 million, or 2.1 loss ratio points, for the 2020 first quarter consisted of \$21.5 million of net favorable development in short-tailed and medium-tailed lines and net adverse development of \$9.9 million in long-tailed lines. Net favorable development in short-tailed and medium-tailed lines reflected \$11.9 million of favorable development in other specialty lines across most underwriting years (*i.e.*, all premiums and losses attributable to contracts having an inception or renewal date within the given twelve-month period) and \$10.5 million of favorable development from property catastrophe business, primarily from the 2015 to 2019 underwriting years. Such amounts were partially offset by \$4.3 million of adverse development in property other than property catastrophe business, driven by the 2018 underwriting year. Adverse development in long-tailed lines reflected an increase in casualty reserves from various underwriting years.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The mortgage segment's net favorable development was \$6.1 million, or 1.8 loss ratio points, for the 2020 first quarter. The 2020 first quarter development was primarily driven by subrogation recoveries on second lien business and student loan business.

2019 First Quarter

During the 2019 first quarter, the Company recorded net favorable development on prior year loss reserves of \$39.4 million, which consisted of \$4.4 million of favorable development from the insurance segment, \$36.6 million from the mortgage segment and \$0.1 million from the 'other' segment, partially offset by \$1.7 million of adverse development from the reinsurance segment.

The insurance segment's net favorable development of \$4.4 million, or 0.8 loss ratio points, for the 2019 first quarter consisted of \$9.7 million of net favorable development in short-tailed lines, \$7.0 million of net adverse development in medium-tailed lines and \$1.7 million of net favorable development in long-tailed lines. Net favorable development in short-tailed lines primarily resulted from property (including special risk other than marine) reserves from the 2017 accident year (i.e., the year in which a loss occurred). Net adverse development in medium-tailed lines primarily resulted from \$7.7 million of adverse development on program business and \$6.0 million of adverse development on contract binding business. Such amounts were partially offset by \$6.7 million of net favorable development in other medium-tailed lines, including professional liability and surety business, across most accident years.

The reinsurance segment's net adverse development of \$1.7 million, or 0.5 loss ratio points, for the 2019 first quarter consisted of \$6.2 million of net adverse development from short-tailed lines, partially offset by \$4.5 million of net favorable development from long-tailed and medium-tailed lines. Net adverse development in short-tailed lines included \$13.8 million from property catastrophe and property other than property catastrophe reserves, primarily due to an increase in reserves on Typhoon Jebi of \$16.0 million based on receipt of updated information from cedents and additional updated industry data. Such amounts were partially offset by net favorable development of \$9.6 million from other specialty reserves, primarily from the 2016 and 2018 underwriting years (i.e., all premiums and losses attributable to contracts having an inception or renewal date within the given twelve-month period). Favorable development in long-tailed and medium-tailed lines reflected reductions in casualty and marine reserves from most underwriting years.

The mortgage segment's net favorable development was \$36.6 million, or 11.3 loss ratio points, for the 2019 first quarter. The 2019 first quarter development was primarily driven by continued favorable claim rates on first lien business and subrogation recoveries on second lien business.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

6. Allowance for Expected Credit Losses

Premiums Receivable

The following table provides a roll forward of the allowance for expected credit losses of the Company's premium receivables.

	March 31, 2020	
	Premium Receivables, Net of Allowance	Allowance for Expected Credit Losses
Balance at beginning of period	\$ 1,778,717	\$ 21,003
Cumulative effect of accounting change (1)		6,539
Change for provision for expected credit losses		448
Write-offs charged against the allowance		—
Balance at end of period	\$ 2,155,204	\$ 27,990

(1) Adoption of ASU 2016-13, "Financial Instruments - Credit Losses (Topic 326)" See [note 1](#).

Reinsurance Recoverables

The following table provides a roll forward of the allowance for expected credit losses of the Company's reinsurance recoverables.

	March 31, 2020	
	Reinsurance Recoverables, Net of Allowance	Allowance for Expected Credit Losses
Balance at beginning of period	\$ 4,346,816	\$ 1,364
Cumulative effect of accounting change (1)		12,010
Additions for current-period provision for expected credit losses		326
Write-offs charged against the allowance		—
Balance at end of period	\$ 4,303,135	\$ 13,700

(1) Adoption of ASU 2016-13, "Financial Instruments - Credit Losses (Topic 326)" See [note 1](#).

At March 31, 2020 and December 31, 2019, approximately 60.8% and 61.2% of reinsurance recoverables on paid and unpaid losses (not including ceded unearned premiums) of \$4.32 billion and \$4.35 billion, respectively, were due from carriers which had an A.M. Best rating of "A-" or better while 38.4% and 38.8%, respectively, were from companies not rated. For items not rated, over 90% of such amount was collateralized through reinsurance trusts or letters of credit at March 31, 2020 and December 31, 2019. The largest reinsurance recoverables from any one carrier were approximately 1.9% and 1.7%, of total shareholders' equity available to Arch at March 31, 2020 and December 31, 2019, respectively.

Contractholder Receivables

The following table provides a roll forward of the allowance for expected credit losses of the Company's contractholder receivables.

	March 31, 2020	
	Contractholder Receivables, Net of Allowance	Allowance for Expected Credit Losses
Balance at beginning of period	\$ 2,119,460	\$ —
Cumulative effect of accounting change (1)		6,663
Additions for current-period provision for expected credit losses		2,375
Write-offs charged against the allowance		—
Balance at end of period	\$ 2,140,724	\$ 9,038

(1) Adoption of ASU 2016-13, "Financial Instruments - Credit Losses (Topic 326)" See [note 1](#).

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

7. Investment Information

At March 31, 2020, total investable assets of \$24.88 billion included \$22.38 billion held by the Company and \$2.50 billion attributable to Watford.

Available For Sale Investments

The following table summarizes the fair value and cost or amortized cost of the Company's securities classified as available for sale:

	Estimated Fair Value	Gross Unrealized Gains	Gross Unrealized Losses	Allowance for Expected Credit Losses (2)	Cost or Amortized Cost
March 31, 2020					
Fixed maturities (1):					
Corporate bonds	\$ 6,552,825	\$ 176,246	\$ (118,340)	\$ (7,233)	\$ 6,502,152
Mortgage backed securities	466,045	16,006	(6,208)	(208)	456,455
Municipal bonds	862,415	27,287	(7,550)	(23)	842,701
Commercial mortgage backed securities	780,358	11,657	(18,410)	(306)	787,417
U.S. government and government agencies	4,574,630	143,987	(300)	—	4,430,943
Non-U.S. government securities	2,035,459	57,289	(105,533)	—	2,083,703
Asset backed securities	1,747,281	12,155	(91,668)	(2,139)	1,828,933
Total	17,019,013	444,627	(348,009)	(9,909)	16,932,304
Short-term investments	944,531	2,461	(2,779)	(29)	944,878
Total	\$ 17,963,544	\$ 447,088	\$ (350,788)	\$ (9,938)	\$ 17,877,182
December 31, 2019					
Fixed maturities (1):					
Corporate bonds	\$ 6,406,591	\$ 191,889	\$ (12,793)		\$ 6,227,495
Mortgage backed securities	562,309	9,669	(931)		553,571
Municipal bonds	881,926	24,628	(2,213)		859,511
Commercial mortgage backed securities	733,108	14,951	(2,330)		720,487
U.S. government and government agencies	4,916,592	36,600	(10,134)		4,890,126
Non-U.S. government securities	2,078,757	48,549	(20,330)		2,050,538
Asset backed securities	1,683,753	24,017	(4,724)		1,664,460
Total	17,263,036	350,303	(53,455)		16,966,188
Short-term investments	956,546	811	(1,548)		957,283
Total	\$ 18,219,582	\$ 351,114	\$ (55,003)		\$ 17,923,471

- (1) In securities lending transactions, the Company receives collateral in excess of the fair value of the fixed maturities pledged. For purposes of this table, the Company has excluded the collateral received under securities lending, at fair value and included the securities pledged under securities lending, at fair value. See "—Securities Lending Agreements."
- (2) Effective January 1, 2020, the Company adopted ASU 2016-13 and as a result any credit impairment losses on the Company's available-for-sale investments are recorded as an allowance, subject to reversal. See [note 1](#).

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following table summarizes, for all available for sale securities in an unrealized loss position, the fair value and gross unrealized loss by length of time the security has been in a continual unrealized loss position:

	Less than 12 Months		12 Months or More		Total	
	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses
March 31, 2020						
Fixed maturities (1):						
Corporate bonds	\$ 2,377,206	\$ (116,795)	\$ 7,865	\$ (1,545)	\$ 2,385,071	\$ (118,340)
Mortgage backed securities	99,108	(6,183)	116	(25)	99,224	(6,208)
Municipal bonds	278,557	(7,550)	—	—	278,557	(7,550)
Commercial mortgage backed securities	419,028	(18,075)	2,342	(335)	421,370	(18,410)
U.S. government and government agencies	216,620	(300)	2,000	—	218,620	(300)
Non-U.S. government securities	1,484,987	(105,533)	—	—	1,484,987	(105,533)
Asset backed securities	1,003,251	(86,283)	28,724	(5,385)	1,031,975	(91,668)
Total	5,878,757	(340,719)	41,047	(7,290)	5,919,804	(348,009)
Short-term investments	83,196	(2,779)	—	—	83,196	(2,779)
Total	\$ 5,961,953	\$ (343,498)	\$ 41,047	\$ (7,290)	\$ 6,003,000	\$ (350,788)

December 31, 2019						
Fixed maturities (1):						
Corporate bonds	\$ 675,131	\$ (12,350)	\$ 37,671	\$ (443)	\$ 712,802	\$ (12,793)
Mortgage backed securities	102,887	(927)	203	(4)	103,090	(931)
Municipal bonds	220,296	(2,213)	—	—	220,296	(2,213)
Commercial mortgage backed securities	147,290	(2,302)	2,683	(28)	149,973	(2,330)
U.S. government and government agencies	1,373,127	(10,089)	32,058	(45)	1,405,185	(10,134)
Non-U.S. government securities	1,224,243	(20,163)	37,610	(167)	1,261,853	(20,330)
Asset backed securities	441,522	(3,334)	48,313	(1,390)	489,835	(4,724)
Total	4,184,496	(51,378)	158,538	(2,077)	4,343,034	(53,455)
Short-term investments	95,777	(1,548)	—	—	95,777	(1,548)
Total	\$ 4,280,273	\$ (52,926)	\$ 158,538	\$ (2,077)	\$ 4,438,811	\$ (55,003)

(1) In securities lending transactions, the Company receives collateral in excess of the fair value of the fixed maturities pledged. For purposes of this table, the Company has excluded the collateral received under securities lending, at fair value and included the securities pledged under securities lending, at fair value. See “—Securities Lending Agreements.”

At March 31, 2020, on a lot level basis, approximately 5,420 security lots out of a total of approximately 9,960 security lots were in an unrealized loss position and the largest single unrealized loss from a single lot in the Company’s fixed maturity portfolio was \$6.3 million. At December 31, 2019, on a lot level basis, approximately 2,230 security lots out of a total of approximately 9,590 security lots were in an unrealized loss position and the largest single unrealized loss from a single lot in the Company’s fixed maturity portfolio was \$0.9 million.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The contractual maturities of the Company's fixed maturities are shown in the following table. Expected maturities, which are management's best estimates, will differ from contractual maturities because borrowers may have the right to call or prepay obligations with or without call or prepayment penalties.

Maturity	March 31, 2020		December 31, 2019	
	Estimated Fair Value	Amortized Cost	Estimated Fair Value	Amortized Cost
Due in one year or less	\$ 445,134	\$ 445,701	\$ 428,659	\$ 423,617
Due after one year through five years	9,622,046	9,558,975	10,126,403	9,996,206
Due after five years through 10 years	3,435,903	3,358,574	3,317,535	3,219,567
Due after 10 years	522,246	496,249	411,269	388,280
	14,025,329	13,859,499	14,283,866	14,027,670
Mortgage backed securities	466,045	456,455	562,309	553,571
Commercial mortgage backed securities	780,358	787,417	733,108	720,487
Asset backed securities	1,747,281	1,828,933	1,683,753	1,664,460
Total (1)	\$ 17,019,013	\$ 16,932,304	\$ 17,263,036	\$ 16,966,188

- (1) In securities lending transactions, the Company receives collateral in excess of the fair value of the securities pledged. For purposes of this table, the Company has excluded the collateral received under securities lending, at fair value and included the securities pledged under securities lending, at fair value.
See "—Securities Lending Agreements."

Securities Lending Agreements

The Company enters into securities lending agreements with financial institutions to enhance investment income whereby it loans certain of its securities to third parties, primarily major brokerage firms, for short periods of time through a lending agent. The Company maintains legal control over the securities it lends (shown as 'Securities pledged under securities lending, at fair value' on the Company's balance sheet), retains the earnings and cash flows associated with the loaned securities and receives a fee from the borrower for the temporary use of the securities. An indemnification agreement with the lending agent protects the Company in the event a borrower becomes insolvent or fails to return any of the securities on loan from the Company.

The Company receives collateral (shown as 'Collateral received under securities lending, at fair value' on the Company's balance sheet) in the form of cash or U.S. government and government agency securities. At March 31, 2020, the fair value of the cash collateral received on securities lending was \$26.2 million and the fair value of security collateral received was \$156.1 million. At December 31, 2019, the fair value of the cash collateral received on securities lending was \$81.2 million, and the fair value of security collateral received was \$307.2 million.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The carrying value of collateral held under the Company's securities lending transactions by significant investment category and remaining contractual maturity of the underlying agreements is as follows:

	Remaining Contractual Maturity of the Agreements				
	Overnight and Continuous	Less than 30 Days	30-90 Days	90 Days or More	Total
March 31, 2020					
U.S. government and government agencies	\$ 144,375	\$ —	\$ 14,316	\$ —	\$ 158,691
Corporate bonds	11,715	—	—	—	11,715
Equity securities	11,868	—	—	—	11,868
Total	\$ 167,958	\$ —	\$ 14,316	\$ —	\$ 182,274
Gross amount of recognized liabilities for securities lending in offsetting disclosure in note 9					\$ —
Amounts related to securities lending not included in offsetting disclosure in note 9					\$ 182,274
December 31, 2019					
U.S. government and government agencies	\$ 240,332	\$ —	\$ 115,973	\$ —	\$ 356,305
Corporate bonds	2,570	—	—	—	2,570
Equity securities	29,491	—	—	—	29,491
Total	\$ 272,393	\$ —	\$ 115,973	\$ —	\$ 388,366
Gross amount of recognized liabilities for securities lending in offsetting disclosure in note 9					\$ —
Amounts related to securities lending not included in offsetting disclosure in note 9					\$ 388,366

Equity Securities, at Fair Value

At March 31, 2020, the Company held \$1.18 billion of equity securities, at fair value, compared to \$838.9 million at December 31, 2019. Such holdings include publicly traded common stocks primarily in the consumer cyclical and non-cyclical, technology, communication and financial sectors and exchange-traded funds in fixed income, equity and other sectors.

Other Investments

The following table summarizes the Company's other investments which are included in investments accounted for using the fair value option, by strategy:

	March 31, 2020	December 31, 2019
Term loan investments	\$ 1,135,584	\$ 1,326,018
Lending	544,308	602,841
Credit related funds	111,874	123,020
Energy	63,057	97,402
Investment grade fixed income	137,370	151,594
Infrastructure	33,644	61,786
Private equity	51,284	49,376
Real estate	14,296	17,279
Total	\$ 2,091,417	\$ 2,429,316

Investments Accounted For Using the Equity Method

The following table summarizes the Company's investments accounted for using the equity method, by strategy:

	March 31, 2020	December 31, 2019
Credit related funds	\$ 421,943	\$ 428,437
Equities	256,249	293,686
Real estate	254,957	246,851
Lending	194,132	202,690
Private equity	154,322	144,983
Infrastructure	283,147	235,033
Energy	111,305	108,716
Total	\$ 1,676,055	\$ 1,660,396

Certain of the Company's other investments are in investment funds for which the Company has the option to redeem at agreed upon values as described in each investment fund's subscription agreement. Depending on the terms of the various subscription agreements, investments in investment funds may be redeemed daily, monthly, quarterly or on other terms. Two common redemption restrictions which may impact the Company's ability to redeem these investment funds are gates and lockups. A gate is a suspension of redemptions which may be implemented by the general partner or investment manager of the fund in order to defer, in whole or in part, the redemption request in the event the aggregate amount of redemption requests exceeds a predetermined percentage of the investment fund's net assets which may otherwise hinder the general partner or investment manager's ability to liquidate holdings in an orderly fashion in order to generate the cash necessary to fund extraordinarily large redemption payouts. A lockup period

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

is the initial amount of time an investor is contractually required to hold the security before having the ability to redeem. If the investment funds are eligible to be redeemed, the time to redeem such fund can take weeks or months following the notification.

Fair Value Option

The following table summarizes the Company's assets which are accounted for using the fair value option:

	March 31, 2020	December 31, 2019
Fixed maturities	\$ 734,694	\$ 754,452
Other investments	2,091,417	2,429,316
Short-term investments	396,409	377,014
Equity securities	87,997	102,695
Investments accounted for using the fair value option	\$ 3,310,517	\$ 3,663,477

Limited Partnership Interests

In the normal course of its activities, the Company invests in limited partnerships as part of its overall investment strategy. Such amounts are included in 'investments accounted for using the equity method' and 'investments accounted for using the fair value option.' The Company has determined that it is not required to consolidate these investments because it is not the primary beneficiary of the funds. The Company's maximum exposure to loss with respect to these investments is limited to the investment carrying amounts reported in the Company's consolidated balance sheet and any unfunded commitment.

The following table summarizes investments in limited partnership interests where the Company has a variable interest by balance sheet line item:

	March 31, 2020	December 31, 2019
Investments accounted for using the equity method (1)	1,676,055	1,660,396
Investments accounted for using the fair value option (2)	170,515	188,283
Total	\$ 1,846,570	\$ 1,848,679

(1) Aggregate unfunded commitments were \$1.30 billion at March 31, 2020, compared to \$1.36 billion at December 31, 2019.

(2) Aggregate unfunded commitments were \$40.2 million at March 31, 2020, compared to \$41.7 million at December 31, 2019.

Net Investment Income

The components of net investment income were derived from the following sources:

	March 31,	
	2020	2019
Three Months Ended		
Fixed maturities	\$ 114,847	\$ 129,799
Term loans	23,170	24,616
Equity securities	6,007	2,988
Short-term investments	4,896	4,179
Other (1)	19,406	21,196
Gross investment income	168,326	182,778
Investment expenses	(23,173)	(25,829)
Net investment income	\$ 145,153	\$ 156,949

(1) Includes income distributions from investment funds and other items.

Net Realized Gains (Losses)

Net realized gains (losses) (which include changes in the allowance for credit losses on financial assets and net impairment losses recognized in earnings) were as follows:

	March 31,	
	2020	2019
Three Months Ended		
Available for sale securities:		
Gross gains on investment sales	\$ 178,200	\$ 43,365
Gross losses on investment sales	(31,968)	(31,656)
Change in fair value of assets and liabilities accounted for using the fair value option:		
Fixed maturities	(127,666)	31,148
Other investments	(307,800)	18,195
Equity securities	(4,909)	4,266
Short-term investments	(8,681)	720
Equity securities, at fair value:		
Net realized gains (losses) on sales during the period	(539)	10,930
Net unrealized gains (losses) on equity securities still held at reporting date	(175,566)	37,136
Allowance for credit losses:		
Investments related	(9,320)	—
Underwriting related	(3,270)	—
Net impairment losses	(533)	(1,309)
Derivative instruments (1)	127,189	35,871
Other	(2,097)	(8,410)
Net realized gains (losses)	\$ (366,960)	\$ 140,256

(1) See [note 9](#) for information on the Company's derivative instruments.

Equity in Net Income (Loss) of Investment Funds Accounted for Using the Equity Method

The Company recorded a loss of \$4.2 million related to investment funds accounted for using the equity method in the 2020 first quarter, compared to an income of \$46.9 million for the 2019 first quarter. In applying the equity method, investments are initially recorded at cost and are subsequently adjusted based on the Company's proportionate share of the net income or loss of the

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

value of the underlying securities in the funds). Such investments are generally recorded on a one to three month lag based on the availability of reports from the investment funds.

Allowance for Expected Credit Losses

The following table provides a roll forward of the allowance for expected credit losses of the Company's securities classified as available for sale:

	March 31, 2020				
	Structured Securities (1)	Municipal Bonds	Corporate Bonds	Short Term Investments	Total
Three Months Ended					
Balance at beginning of period	\$ —	\$ —	\$ —	\$ —	\$ —
Cumulative effect of accounting change	517	—	117	—	634
Additions for current-period provision for expected credit losses	2,146	23	7,151	29	9,349
Additions (reductions) for previously recognized expected credit losses	(2)	—	(21)	—	(23)
Reductions due to disposals	(7)	—	(15)	—	(22)
Write-offs charged against the allowance	—	—	—	—	—
Balance at end of period	\$ 2,654	\$ 23	\$ 7,232	\$ 29	\$ 9,938

(1) Includes asset backed securities, mortgage backed securities and commercial mortgage backed securities.

Restricted Assets

The Company is required to maintain assets on deposit, which primarily consist of fixed maturities, with various regulatory authorities to support its underwriting operations. The Company's subsidiaries maintain assets in trust accounts as collateral for transactions with affiliated companies and also have investments in segregated portfolios primarily to provide collateral or guarantees for letters of credit to third parties. See note 17, "Commitments and Contingencies," of the notes to consolidated financial statements in the Company's 2019 Form 10-K.

The following table details the value of the Company's restricted assets:

	March 31, 2020	December 31, 2019
Assets used for collateral or guarantees:		
Affiliated transactions	\$ 4,540,455	\$ 4,526,761
Third party agreements	2,277,298	2,278,248
Deposits with U.S. regulatory authorities	831,411	797,371
Deposits with non-U.S. regulatory authorities	162,336	119,238
Total restricted assets	\$ 7,811,500	\$ 7,721,618

In addition, Watford maintains a secured credit facility to provide borrowing capacity for investment purposes and a total return swap agreement and maintains assets pledged as collateral for such purposes. The Company does not guarantee or provide credit support for Watford, and the Company's financial exposure to Watford is limited to its investment in Watford's senior notes, common and preferred shares and counterparty credit risk (mitigated by collateral) arising from reinsurance transactions. As of March 31, 2020 and December 31, 2019, Watford held \$1.06 billion and \$1.0 billion, respectively, in pledged assets to collateralize the credit facility mentioned above.

Reconciliation of Cash and Restricted Cash

The following table details reconciliation of cash and restricted cash within the Consolidated Balance Sheets:

	March 31, 2020	December 31, 2019
Cash	\$ 882,284	\$ 726,230
Restricted cash (included in 'other assets')	\$ 188,153	\$ 177,468
Cash and restricted cash	\$ 1,070,437	\$ 903,698

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

8. Fair Value

Accounting guidance regarding fair value measurements addresses how companies should measure fair value when they are required to use a fair value measure for recognition or disclosure purposes under GAAP and provides a common definition of fair value to be used throughout GAAP. It defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly fashion between market participants at the measurement date. In addition, it establishes a three-level valuation hierarchy for the disclosure of fair value measurements. The valuation hierarchy is based upon the transparency of inputs to the valuation of an asset or liability as of the measurement date. The level in the hierarchy within which a given fair value measurement falls is determined based on the lowest level input that is significant to the measurement (Level 1 being the highest priority and Level 3 being the lowest priority).

The levels in the hierarchy are defined as follows:

- Level 1: Inputs to the valuation methodology are observable inputs that reflect quoted prices (unadjusted) for *identical* assets or liabilities in *active markets*
- Level 2: Inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument
- Level 3: Inputs to the valuation methodology are unobservable and significant to the fair value measurement

Following is a description of the valuation methodologies used for securities measured at fair value, as well as the general classification of such securities pursuant to the valuation hierarchy. The Company reviews its securities measured at fair value and discusses the proper classification of such investments with investment advisers and others.

The Company determines the existence of an active market based on its judgment as to whether transactions for the financial instrument occur in such market with sufficient frequency and volume to provide reliable pricing information. The independent pricing sources obtain market quotations and actual transaction prices for securities that have quoted prices in active markets. The Company uses quoted values and other data provided by nationally recognized independent pricing sources as inputs into its process for determining fair values of its fixed maturity investments. To validate the techniques or models used by pricing sources, the Company's review process includes, but is not limited to: (i) quantitative analysis (*e.g.*,

comparing the quarterly return for each managed portfolio to its target benchmark, with significant differences identified and investigated); (ii) a review of the average number of prices obtained in the pricing process and the range of resulting fair values; (iii) initial and ongoing evaluation of methodologies used by outside parties to calculate fair value; (iv) a comparison of the fair value estimates to the Company's knowledge of the current market; (v) a comparison of the pricing services' fair values to other pricing services' fair values for the same investments; and (vi) periodic back-testing, which includes randomly selecting purchased or sold securities and comparing the executed prices to the fair value estimates from the pricing service. A price source hierarchy was maintained in order to determine which price source would be used (*i.e.*, a price obtained from a pricing service with more seniority in the hierarchy will be used over a less senior one in all cases). The hierarchy prioritizes pricing services based on availability and reliability and assigns the highest priority to index providers. Based on the above review, the Company will challenge any prices for a security or portfolio which are considered not to be representative of fair value. The Company did not adjust any of the prices obtained from the independent pricing sources at March 31, 2020.

In certain circumstances, when fair values are unavailable from these independent pricing sources, quotes are obtained directly from broker-dealers who are active in the corresponding markets. Such quotes are subject to the validation procedures noted above. Of the \$22.70 billion of financial assets and liabilities measured at fair value at March 31, 2020, approximately \$195.5 million, or 0.9%, were priced using non-binding broker-dealer quotes. Of the \$22.90 billion of financial assets and liabilities measured at fair value at December 31, 2019, approximately \$179.6 million, or 0.8%, were priced using non-binding broker-dealer quotes.

Fixed maturities

The Company uses the market approach valuation technique to estimate the fair value of its fixed maturity securities, when possible. The market approach includes obtaining prices from independent pricing services, such as index providers and pricing vendors, as well as to a lesser extent quotes from broker-dealers. The independent pricing sources obtain market quotations and actual transaction prices for securities that have quoted prices in active markets. Each source has its own proprietary method for determining the fair value of securities that are not actively traded. In general, these methods involve the use of "matrix pricing" in which the independent pricing source uses observable market inputs including, but not limited to, investment yields, credit risks and spreads, benchmarking of like securities, broker-dealer quotes, reported trades and sector groupings to determine a reasonable fair value.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following describes the significant inputs generally used to determine the fair value of the Company's fixed maturity securities by asset class:

- U.S. government and government agencies — valuations provided by independent pricing services, with all prices provided through index providers and pricing vendors. The Company determined that all U.S. Treasuries would be classified as Level 1 securities due to observed levels of trading activity, the high number of strongly correlated pricing quotes received on U.S. Treasuries and other factors. The fair values of U.S. government agency securities are generally determined using the spread above the risk-free yield curve. As the yields for the risk-free yield curve and the spreads for these securities are observable market inputs, the fair values of U.S. government agency securities are classified within Level 2.
- Corporate bonds — valuations provided by independent pricing services, substantially all through index providers and pricing vendors with a small amount through broker-dealers. The fair values of these securities are generally determined using the spread above the risk-free yield curve. These spreads are generally obtained from the new issue market, secondary trading and from broker-dealers who trade in the relevant security market. As the significant inputs used in the pricing process for corporate bonds are observable market inputs, the fair value of these securities are classified within Level 2. A small number of securities are included in Level 3 due to a low level of transparency on the inputs used in the pricing process.
- Mortgage-backed securities — valuations provided by independent pricing services, substantially all through pricing vendors and index providers with a small amount through broker-dealers. The fair values of these securities are generally determined through the use of pricing models (including Option Adjusted Spread) which use spreads to determine the expected average life of the securities. These spreads are generally obtained from the new issue market, secondary trading and from broker-dealers who trade in the relevant security market. The pricing services also review prepayment speeds and other indicators, when applicable. As the significant inputs used in the pricing process for mortgage-backed securities are observable market inputs, the fair value of these securities are classified within Level 2. A small number of securities are included in Level 3 due to a low level of transparency on the inputs used in the pricing process.
- Municipal bonds — valuations provided by independent pricing services, with all prices provided through index providers and pricing vendors. The fair values of these securities are generally determined using spreads obtained from broker-dealers who trade in the relevant security market, trade prices and the new issue market. As the significant inputs used in the pricing process for municipal bonds are observable market inputs, the fair value of these securities are classified within Level 2.

- Commercial mortgage-backed securities — valuations provided by independent pricing services, substantially all through index providers and pricing vendors with a small amount through broker-dealers. The fair values of these securities are generally determined through the use of pricing models which use spreads to determine the appropriate average life of the securities. These spreads are generally obtained from the new issue market, secondary trading and from broker-dealers who trade in the relevant security market. The pricing services also review prepayment speeds and other indicators, when applicable. As the significant inputs used in the pricing process for commercial mortgage-backed securities are observable market inputs, the fair value of these securities are classified within Level 2.

- Non-U.S. government securities — valuations provided by independent pricing services, with all prices provided through index providers and pricing vendors. The fair values of these securities are generally based on international indices or valuation models which include daily observed yield curves, cross-currency basis index spreads and country credit spreads. As the significant inputs used in the pricing process for non-U.S. government securities are observable market inputs, the fair value of these securities are classified within Level 2.

- Asset-backed securities — valuations provided by independent pricing services, substantially all through index providers and pricing vendors with a small amount through broker-dealers. The fair values of these securities are generally determined through the use of pricing models (including Option Adjusted Spread) which use spreads to determine the appropriate average life of the securities. These spreads are generally obtained from the new issue market, secondary trading and from broker-dealers who trade in the relevant security market. The pricing services also review prepayment speeds and other indicators, when applicable. As the significant inputs used in the pricing process for asset-backed securities are observable market inputs, the fair value of these securities are classified within Level 2. A small number of securities are included in Level 3 due to a low level of transparency on the inputs used in the pricing process.

Equity securities

The Company determined that exchange-traded equity securities would be included in Level 1 as their fair values are based on quoted market prices in active markets. Certain equity securities are included in Level 2 of the valuation hierarchy as the significant inputs used in the pricing process for such securities are observable market inputs. Other equity securities are included in Level 3 due to the lack of an available independent price source for such securities. As the significant inputs used to price these securities are unobservable, the fair value of such securities are classified as Level 3.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

Other investments

The Company determined that exchange-traded investments in mutual funds would be included in Level 1 as their fair values are based on quoted market prices in active markets. Other investments also include term loan investments for which fair values are estimated by using quoted prices of term loan investments with similar characteristics, pricing models or matrix pricing. Such investments are generally classified within Level 2. The fair values for certain of the Company's other investments are determined using net asset values as advised by external fund managers. The net asset value is based on the fund manager's valuation of the underlying holdings in accordance with the fund's governing documents. In accordance with applicable accounting guidance, certain investments that are measured at fair value using the net asset value per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy. A small number of securities are included in Level 3 due to the lack of an available independent price source for such securities.

Derivative instruments

The Company's futures contracts, foreign currency forward contracts, interest rate swaps and other derivatives trade in the over-the-counter derivative market. The Company uses the market approach valuation technique to estimate the fair value for these derivatives based on significant observable market inputs from third party pricing vendors, non-binding broker-dealer quotes and/or recent trading activity. As the significant inputs used in the pricing process for these derivative instruments are observable market inputs, the fair value of these securities are classified within Level 2.

Short-term investments

The Company determined that certain of its short-term investments held in highly liquid money market-type funds, Treasury bills and commercial paper would be included in Level 1 as their fair values are based on quoted market prices in active markets. The fair values of other short-term investments are generally determined using the spread above the risk-free yield curve and are classified within Level 2.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following table presents the Company's financial assets and liabilities measured at fair value by level at March 31, 2020:

	Estimated Fair Value	Estimated Fair Value Measurements Using:		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<u>Assets measured at fair value (1):</u>				
Available for sale securities:				
Fixed maturities:				
Corporate bonds	\$ 6,552,825	\$ —	\$ 6,550,845	\$ 1,980
Mortgage backed securities	466,045	—	465,821	224
Municipal bonds	862,415	—	862,415	—
Commercial mortgage backed securities	780,358	—	780,358	—
U.S. government and government agencies	4,574,630	4,480,074	94,556	—
Non-U.S. government securities	2,035,459	—	2,035,459	—
Asset backed securities	1,747,281	—	1,743,659	3,622
Total	17,019,013	4,480,074	12,533,113	5,826
Short-term investments	944,531	884,527	60,004	—
Equity securities, at fair value	1,181,903	1,122,694	3,577	55,632
Derivative instruments (4)	92,052	—	92,052	—
Fair value option:				
Corporate bonds	493,639	—	492,674	965
Non-U.S. government bonds	79,209	—	79,209	—
Mortgage backed securities	13,293	—	13,293	—
Municipal bonds	251	—	251	—
Commercial mortgage backed securities	1,059	—	1,059	—
Asset backed securities	146,646	—	146,646	—
U.S. government and government agencies	597	484	113	—
Short-term investments	396,409	321,401	75,008	—
Equity securities	87,997	27,825	157	60,015
Other investments	1,177,508	24,930	1,097,958	54,620
Other investments measured at net asset value (2)	913,909			
Total	3,310,517	374,640	1,906,368	115,600
Total assets measured at fair value	\$ 22,548,016	\$ 6,861,935	\$ 14,595,114	\$ 177,058
<u>Liabilities measured at fair value:</u>				
Contingent consideration liabilities	\$ (7,967)	\$ —	\$ —	\$ (7,967)
Securities sold but not yet purchased (3)	(30,076)	—	(30,076)	—
Derivative instruments (4)	(116,572)	—	(116,572)	—
Total liabilities measured at fair value	\$ (154,615)	\$ —	\$ (146,648)	\$ (7,967)

- (1) In securities lending transactions, the Company receives collateral in excess of the fair value of the securities pledged. For purposes of this table, the Company has excluded the collateral received under securities lending, at fair value and included the securities pledged under securities lending, at fair value. See [note 7](#), "—Securities Lending Agreements."
- (2) In accordance with applicable accounting guidance, certain investments that are measured at fair value using the net asset value per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the amounts presented in the consolidated balance sheets.
- (3) Represents the Company's obligations to deliver securities that it did not own at the time of sale. Such amounts are included in "other liabilities" on the Company's consolidated balance sheets.
- (4) See [note 9](#).

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following table presents the Company's financial assets and liabilities measured at fair value by level at December 31, 2019:

	Estimated Fair Value	Estimated Fair Value Measurements Using:		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<u>Assets measured at fair value (1):</u>				
Available for sale securities:				
Fixed maturities:				
Corporate bonds	\$ 6,406,591	\$ —	\$ 6,397,740	\$ 8,851
Mortgage backed securities	562,309	—	562,055	254
Municipal bonds	881,926	—	881,926	—
Commercial mortgage backed securities	733,108	—	733,108	—
U.S. government and government agencies	4,916,592	4,805,581	111,011	—
Non-U.S. government securities	2,078,757	—	2,078,757	—
Asset backed securities	1,683,753	—	1,678,791	4,962
Total	17,263,036	4,805,581	12,443,388	14,067
Equity securities	850,283	789,596	4,798	55,889
Short-term investments	956,546	904,804	51,742	—
Derivative instruments (4)	48,946	—	48,946	—
Fair value option:				
Corporate bonds	488,402	—	487,470	932
Non-U.S. government bonds	50,465	—	50,465	—
Mortgage backed securities	11,947	—	11,947	—
Municipal bonds	377	—	377	—
Commercial mortgage backed securities	1,134	—	1,134	—
Asset backed securities	200,163	—	200,163	—
U.S. government and government agencies	1,962	1,852	110	—
Short-term investments	377,014	333,320	43,694	—
Equity securities	102,697	43,962	641	58,094
Other investments	1,418,273	53,287	1,296,169	68,817
Other investments measured at net asset value (2)	1,011,043			
Total	3,663,477	432,421	2,092,170	127,843
Total assets measured at fair value	\$ 22,782,288	\$ 6,932,402	\$ 14,641,044	\$ 197,799
<u>Liabilities measured at fair value:</u>				
Contingent consideration liabilities	\$ (7,998)	\$ —	\$ —	\$ (7,998)
Securities sold but not yet purchased (3)	(66,257)	—	(66,257)	—
Derivative instruments (4)	(39,750)	—	(39,750)	—
Total liabilities measured at fair value	\$ (114,005)	\$ —	\$ (106,007)	\$ (7,998)

- (1) In securities lending transactions, the Company receives collateral in excess of the fair value of the securities pledged. For purposes of this table, the Company has excluded the collateral received under securities lending, at fair value and included the securities pledged under securities lending, at fair value. See [note 7](#), "—Securities Lending Agreements."
- (2) In accordance with applicable accounting guidance, certain investments that are measured at fair value using the net asset value per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the amounts presented in the consolidated balance sheets.
- (3) Represents the Company's obligations to deliver securities that it did not own at the time of sale. Such amounts are included in "other liabilities" on the Company's consolidated balance sheets.
- (4) See [note 9](#).

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following table presents a reconciliation of the beginning and ending balances for all financial assets and liabilities measured at fair value on a recurring basis using Level 3 inputs:

	Assets						Liabilities	
	Available For Sale		Fair Value Option			Fair Value	Contingent Consideration Liabilities	
	Structured Securities (1)	Corporate Bonds	Corporate Bonds	Other Investments	Equity Securities	Equity Securities		
Three Months Ended March 31, 2020								
Balance at beginning of period	\$ 5,216	\$ 8,851	\$ 932	\$ 68,817	\$ 58,094	\$ 55,889	\$ (7,998)	
Total gains or (losses) (realized/unrealized)								
Included in earnings (2)	9	7	—	(27)	1,921	(3,721)	(54)	
Included in other comprehensive income	(22)	(5,416)	—	—	—	—	—	
Purchases, issuances, sales and settlements								
Purchases	—	—	33	21	—	3,464	—	
Issuances	—	—	—	—	—	—	—	
Sales	—	—	—	(17,175)	—	—	—	
Settlements	(1,357)	(1,462)	—	—	—	—	85	
Transfers in and/or out of Level 3	—	—	—	2,984	—	—	—	
Balance at end of period	\$ 3,846	\$ 1,980	\$ 965	\$ 54,620	\$ 60,015	\$ 55,632	\$ (7,967)	
Three Months Ended March 31, 2019								
Balance at beginning of period	\$ 313	\$ 8,141	\$ 5,758	\$ 62,705	\$ —	\$ —	\$ (66,665)	
Total gains or (losses) (realized/unrealized)								
Included in earnings (2)	1,757	—	(290)	298	—	—	(908)	
Included in other comprehensive income	4	(118)	—	—	—	—	—	
Purchases, issuances, sales and settlements								
Purchases	—	—	—	—	—	—	—	
Issuances	—	—	—	—	—	—	(548)	
Sales	(1,757)	—	(3,235)	(74)	—	—	—	
Settlements	(15)	(456)	—	(600)	—	—	—	
Transfers in and/or out of Level 3	—	—	—	—	—	—	—	
Balance at end of period	\$ 302	\$ 7,567	\$ 2,233	\$ 62,329	\$ —	\$ —	\$ (68,121)	

(1) Includes asset backed securities, mortgage backed securities and commercial mortgage backed securities.

(2) Gains or losses were included in net realized gains (losses).

Financial Instruments Disclosed, But Not Carried, At Fair Value

The Company uses various financial instruments in the normal course of its business. The carrying values of cash, accrued investment income, receivable for securities sold, certain other assets, payable for securities purchased and certain other liabilities approximated their fair values at March 31, 2020, due to their respective short maturities. As these financial instruments are not actively traded, their respective fair values are classified within Level 2.

At March 31, 2020, the Company's senior notes were carried at their cost, net of debt issuance costs, of \$1.87 billion and had a fair value of \$2.26 billion. At December 31, 2019, the Company's senior notes were carried at their cost, net of debt issuance costs, of \$1.87 billion and had a fair value of \$2.34 billion. The fair values of the senior notes were obtained from a third party pricing service and are based on observable market inputs. As such, the fair values of the senior notes are classified within Level 2.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

9. Derivative Instruments

The Company's investment strategy allows for the use of derivative instruments. The Company's derivative instruments are recorded on its consolidated balance sheets at fair value. The Company utilizes exchange traded U.S. Treasury note, Eurodollar and other futures contracts and commodity futures to manage portfolio duration or replicate investment positions in its portfolios and the Company routinely utilizes foreign currency forward contracts, currency options, index futures contracts and other derivatives as part of its total return objective. In addition, certain of the Company's investments are managed in portfolios which incorporate the use of foreign currency forward contracts which are intended to provide an economic hedge against foreign currency movements.

In addition, the Company purchases to-be-announced mortgage backed securities ("TBAs") as part of its investment strategy. TBAs represent commitments to purchase a future issuance of agency mortgage backed securities. For the period between purchase of a TBA and issuance of the underlying security, the Company's position is accounted for as a derivative. The Company purchases TBAs in both long and short positions to enhance investment performance and as part of its overall investment strategy.

The following table summarizes information on the fair values and notional values of the Company's derivative instruments:

	Estimated Fair Value		Notional Value (1)
	Asset Derivatives	Liability Derivatives	
<u>March 31, 2020</u>			
Futures contracts (2)	\$ 17,696	\$ (24,714)	\$ 2,444,851
Foreign currency forward contracts (2)	12,164	(27,015)	1,490,266
TBAs (3)	14,403	—	13,483
Other (2)	62,192	(64,843)	3,062,419
Total	<u>\$ 106,455</u>	<u>\$ (116,572)</u>	
<u>December 31, 2019</u>			
Futures contracts (2)	\$ 10,065	\$ (13,722)	\$ 4,104,559
Foreign currency forward contracts (2)	5,352	(5,327)	686,878
TBAs (3)	55,010	—	53,229
Other (2)	33,529	(20,701)	4,356,300
Total	<u>\$ 103,956</u>	<u>\$ (39,750)</u>	

- (1) Represents the absolute notional value of all outstanding contracts, consisting of long and short positions.
- (2) The fair value of asset derivatives are included in 'other assets' and the fair value of liability derivatives are included in 'other liabilities.'
- (3) The fair value of TBAs are included in 'fixed maturities available for sale, at fair value.'

The Company did not hold any derivatives which were designated as hedging instruments at March 31, 2020 or December 31, 2019.

The Company's derivative instruments can be traded under master netting agreements, which establish terms that apply to all derivative transactions with a counterparty. In the event of a bankruptcy or other stipulated event of default, such agreements provide that the non-defaulting party may elect to terminate all outstanding derivative transactions, in which case all individual derivative positions (loss or gain) with a counterparty are closed out and netted and replaced with a single amount, usually referred to as the termination amount, which is expressed in a single currency. The resulting single net amount, where positive, is payable to the party "in-the-money" regardless of whether or not it is the defaulting party, unless the parties have agreed that only the non-defaulting party is entitled to receive a termination payment where the net amount is positive and is in its favor. Contractual close-out netting reduces derivatives credit exposure from gross to net exposure. The remaining derivatives included in the table above were not subject to a master netting agreement.

At March 31, 2020, asset derivatives and liability derivatives of \$102.1 million and \$108.5 million, respectively, were subject to a master netting agreement, compared to \$97.8 million and \$37.8 million, respectively, at December 31, 2019. The remaining derivatives included in the preceding table were not subject to a master netting agreement.

Realized and unrealized contract gains and losses on the Company's derivative instruments are reflected in 'net realized gains (losses)' in the consolidated statements of income, as summarized in the following table:

Derivatives not designated as hedging instruments:	March 31,	
	2020	2019
Three Months Ended		
Net realized gains (losses):		
Futures contracts	\$ 95,944	\$ 27,336
Foreign currency forward contracts	(10,870)	(13,709)
TBAs	745	190
Other	41,370	22,054
Total	<u>\$ 127,189</u>	<u>\$ 35,871</u>

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

10. Commitments and Contingencies

Investment Commitments

The Company's investment commitments, which are primarily related to agreements entered into by the Company to invest in funds and separately managed accounts when called upon, were approximately \$1.72 billion at March 31, 2020, compared to \$1.69 billion at December 31, 2019.

Interest Paid

Interest paid on the Company's senior notes and other borrowings were \$6.6 million for the three months ended March 31, 2020, consistent with \$6.2 million for the 2019 period.

11. Leases

In the ordinary course of business, the Company renews and enters into new leases for office property and equipment. At the lease inception date, the Company determines whether a contract contains a lease and its classification as a finance or operating lease. Primarily all of the Company's leases are classified as operating leases. The Company's operating leases have remaining lease terms of up to 11 years, some of which include options to extend the lease term. The Company considers these options when determining the lease term and measuring its lease liability and right-of-use asset. In addition, the Company's lease agreements do not contain any material residual value guarantees or material restrictive covenants.

Short-term operating leases with an initial term of twelve months or less were excluded on the Company's consolidated balance sheet and represent an inconsequential amount of operating lease expense.

As most leases do not provide an implicit rate, the Company uses its incremental borrowing rate based on the information available at the lease commencement date in determining the present value of lease payments.

Additional information regarding the Company's operating leases is as follows:

<u>Three Months Ended</u>	<u>March 31,</u>	
	<u>2020</u>	<u>2019</u>
Operating lease costs	\$ 7,992	\$ 7,616
Cash payments included in the measurement of lease liabilities reported in operating cash flows	\$ 8,462	\$ 6,900
Right-of-use assets obtained in exchange for new lease liabilities	\$ 3,560	\$ —
Right-of-use assets (1)	\$ 127,766	\$ 140,741
Operating lease liability (1)	\$ 145,956	\$ 157,729
Weighted average discount rate	3.9%	3.9%
Weighted average remaining lease term	6.3 years	7.2 years

(1) The right-of-use assets are included in 'other assets' while the operating lease liability is included in 'other liabilities.'

The following table presents the contractual maturities of the Company's operating lease liabilities at March 31, 2020:

<u>Years Ending December 31,</u>		
2020 (remainder)	\$	23,994
2021		31,279
2022		28,198
2023		23,692
2024		17,473
2025 and thereafter		40,124
Total undiscounted lease liability	\$	164,760
Less: present value adjustment		(18,804)
Operating lease liability	\$	145,956

12. Variable Interest Entities and Noncontrolling Interests

Watford

In March 2014, the Company invested \$100.0 million and acquired 2,500,000 common shares, approximately 11% of Watford's outstanding common equity. Watford's common shares are listed on the Nasdaq Select Global Market under the ticker symbol "WTRE". As of March 31, 2020, the Company owns approximately 13% of Watford's outstanding common equity.

In July 2019, Watford completed an offering of \$175.0 million in aggregate principal amount of its 6.5% senior notes, due July 2, 2029 ("Watford Senior Notes"). Interest on the Watford Senior Notes is payable semi-annually in arrears on each January 2 and July 2 commencing on January 2, 2020. The \$172.4 million net proceeds from the offering were used to redeem a portion of Watford's outstanding preference shares ("Watford Preference Shares"). The Company purchased \$35.0 million in aggregate principal amount of the Watford Senior Notes.

Watford is considered a VIE and the Company concluded that it is the primary beneficiary of Watford. As such, the results of Watford are included in the Company's consolidated financial statements.

The Company does not guarantee or provide credit support for Watford, and the Company's financial exposure to Watford is limited to its investment in Watford's senior notes, common and preferred shares and counterparty credit risk (mitigated by collateral) arising from reinsurance transactions.

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The following table provides the carrying amount and balance sheet caption in which the assets and liabilities of Watford are reported:

	March 31, 2020	December 31, 2019
Assets		
Investments accounted for using the fair value option	\$ 1,732,086	\$ 1,898,091
Fixed maturities available for sale, at fair value	717,552	745,708
Equity securities, at fair value	63,169	65,338
Cash	96,580	102,437
Accrued investment income	16,344	14,025
Premiums receivable	281,541	273,657
Reinsurance recoverable on unpaid and paid losses and LAE	197,458	170,973
Ceded unearned premiums	128,570	132,577
Deferred acquisition costs	71,402	64,044
Receivable for securities sold	26,789	16,287
Goodwill and intangible assets	7,650	7,650
Other assets	67,493	60,070
Total assets of consolidated VIE	\$ 3,406,634	\$ 3,550,857
Liabilities		
Reserve for losses and loss adjustment expenses	\$ 1,300,249	\$ 1,263,628
Unearned premiums	478,663	438,907
Reinsurance balances payable	71,204	77,066
Revolving credit agreement borrowings	500,587	484,287
Senior notes	172,486	172,418
Payable for securities purchased	63,829	18,180
Other liabilities (1)	203,234	171,714
Total liabilities of consolidated VIE	\$ 2,790,252	\$ 2,626,200
Redeemable noncontrolling interests	\$ 52,328	\$ 52,305

(1) Includes certain borrowings related to investing activities.

For the three months ended March 31, 2020, Watford generated \$24.6 million of cash provided by operating activities, \$35.7 million of cash used for investing activities and \$12.3 million of cash provided by financing activities, compared to \$70.3 million of cash provided by operating activities, \$105.9 million of cash used for investing activities and \$28.1 million of cash provided by financing activities for the three months ended March 31, 2019.

Non-redeemable noncontrolling interests

The Company accounts for the portion of Watford's common equity attributable to third party investors in the shareholders' equity section of its consolidated balance sheets. The noncontrolling ownership in Watford's common shares was approximately 87% at March 31, 2020. The portion of Watford's income or loss attributable to third party investors is recorded in the consolidated statements of income in 'net (income) loss attributable to noncontrolling interests.'

The following table sets forth activity in the non-redeemable noncontrolling interests:

	March 31, 2020	2019
Three Months Ended		
Balance, beginning of year	\$ 762,777	\$ 791,560
Additional paid in capital attributable to noncontrolling interests	(123)	—
Repurchases attributable to non-redeemable noncontrolling interests ⁽¹⁾	(2,867)	—
Amounts attributable to noncontrolling interests	(233,944)	42,382
Other comprehensive income (loss) attributable to noncontrolling interests	(33,058)	4,139
Balance, end of period	\$ 492,785	\$ 838,081

(1) During 2020, Watford's board of directors authorized the investment in Watford's common shares through a share repurchase program.

Redeemable noncontrolling interests

The Company accounts for redeemable noncontrolling interests in the mezzanine section of its consolidated balance sheets in accordance with applicable accounting guidance. Such redeemable noncontrolling interests primarily relate to the Watford Preference Shares issued in late March 2014 with a par value of \$0.01 per share and a liquidation preference of \$25.00 per share. The Watford Preference Shares were issued at a discounted amount of \$24.50 per share. Preferred dividends, including the accretion of the discount and issuance costs, are included in 'net (income) loss attributable to noncontrolling interests' in the Company's consolidated statements of income.

In August 2019, Watford redeemed 6,919,998 of its 9,065,200 issued and outstanding Watford Preference Shares. The Watford Preference Shares were redeemed at a total redemption price of \$25.19748 per share, inclusive of all declared and unpaid dividends, with accumulation of any undeclared dividends on or after June 30, 2019. In addition, the Company received \$11.5 million pursuant to the redemption of Watford Preference Shares.

The following table sets forth activity in the redeemable non-controlling interests:

	March 31, 2020	2019
Three Months Ended		
Balance, beginning of year	\$ 55,404	\$ 206,292
Accretion of preference share issuance costs	23	91
Other	(51)	—
Balance, end of period	\$ 55,376	\$ 206,383

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

The portion of income or loss attributable to third party investors, recorded in the Company's consolidated statements of income in 'net (income) loss attributable to noncontrolling interests,' are summarized in the table below:

	March 31,	
	2020	2019
Three Months Ended		
Amounts attributable to non-redeemable noncontrolling interests	\$ 233,944	\$ (42,382)
Amounts attributable to redeemable noncontrolling interests	(1,153)	(4,588)
Net (income) loss attributable to noncontrolling interests	\$ 232,791	\$ (46,970)

Bellemeade Re

The Company has entered into various aggregate excess of loss mortgage reinsurance agreements with various special purpose reinsurance companies domiciled in Bermuda (the "Bellemeade Agreements"). At the time the Bellemeade Agreements were entered into, the applicability of the accounting guidance that addresses VIEs was evaluated. As a result of the evaluation of the Bellemeade Agreements, the Company concluded that these entities are VIEs. However, given that the ceding insurers do not have the unilateral power to direct those activities that are significant to their economic performance, the Company does not consolidate such entities in its consolidated financial statements.

The following table presents the total assets of the Bellemeade entities, as well as the Company's maximum exposure to loss associated with these VIEs, calculated as the maximum historical observable spread between the one month LIBOR, the basis for the contractual payments to bond holders, and short term invested trust asset yields.

Bellemeade Entities (Issue Date)	Total VIE Assets	Maximum Exposure to Loss		
		On-Balance Sheet (Asset) Liability	Off-Balance Sheet	Total
<u>Mar 31, 2020</u>				
Bellemeade 2017-1 Ltd. (Oct-17)	\$ 190,324	\$ 204	\$ 1,491	\$ 1,695
Bellemeade 2018-1 Ltd. (Apr-18)	299,909	(132)	3,790	3,658
Bellemeade 2018-2 Ltd. (Aug-18)	380,986	83	2,787	2,870
Bellemeade 2018-3 Ltd. (Oct-18)	383,268	(116)	4,272	4,156
Bellemeade 2019-1 Ltd. (Mar-19)	228,940	396	3,072	3,468
Bellemeade 2019-2 Ltd. (Apr-19)	462,057	814	4,373	5,187
Bellemeade 2019-3 Ltd. (Jul-19)	603,465	1,033	8,449	9,482
Bellemeade 2019-4 Ltd. (Oct-19)	563,160	1,420	10,320	11,740
Total	<u>\$ 3,112,109</u>	<u>\$ 3,702</u>	<u>\$ 38,554</u>	<u>\$ 42,256</u>
<u>Dec 31, 2019</u>				
Bellemeade 2017-1 Ltd. (Oct-17)	\$ 216,429	\$ (442)	\$ 2,794	\$ 2,352
Bellemeade 2018-1 Ltd. (Apr-18)	328,482	(1,574)	5,757	4,183
Bellemeade 2018-2 Ltd. (Aug-18)	437,009	(877)	2,524	1,647
Bellemeade 2018-3 Ltd. (Oct-18)	426,806	(1,113)	3,937	2,824
Bellemeade 2019-1 Ltd. (Mar-19)	257,358	(226)	3,027	2,801
Bellemeade 2019-2 Ltd. (Apr-19)	525,959	(78)	2,579	2,501
Bellemeade 2019-3 Ltd. (Jul-19)	656,523	(585)	9,273	8,688
Bellemeade 2019-4 Ltd. (Oct-19)	577,267	(302)	12,193	11,891
Total	<u>\$ 3,425,833</u>	<u>\$ (5,197)</u>	<u>\$ 42,084</u>	<u>\$ 36,887</u>

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

13. Other Comprehensive Income (Loss)

The following tables present details about amounts reclassified from accumulated other comprehensive income and the tax effects allocated to each component of other comprehensive income (loss):

Details About AOCI Components	Consolidated Statement of Income Line Item That Includes Reclassification	Amounts Reclassified from AOCI	
		Three Months Ended	
		March 31,	
		2020	2019
Unrealized appreciation on available-for-sale investments			
	Net realized gains (losses)	\$ 146,232	\$ 11,709
	Provision for credit losses	(9,320)	
	Other-than-temporary impairment losses	(533)	(1,309)
	Total before tax	136,379	10,400
	Income tax (expense) benefit	(15,150)	(179)
	Net of tax	\$ 121,229	\$ 10,221

	Before Tax Amount	Tax Expense (Benefit)	Net of Tax Amount
Three Months Ended March 31, 2020			
Unrealized appreciation (decline) in value of investments:			
Unrealized holding gains (losses) arising during period	\$ (63,451)	\$ (6,164)	\$ (57,287)
Less reclassification of net realized gains (losses) included in net income	136,379	15,150	121,229
Foreign currency translation adjustments	(45,424)	(735)	(44,689)
Other comprehensive income (loss)	\$ (245,254)	\$ (22,049)	\$ (223,205)

Three Months Ended March 31, 2019			
Unrealized appreciation (decline) in value of investments:			
Unrealized holding gains (losses) arising during period	\$ 254,990	\$ 29,103	\$ 225,887
Less reclassification of net realized gains (losses) included in net income	10,400	179	10,221
Foreign currency translation adjustments	5,644	128	5,516
Other comprehensive income (loss)	\$ 250,234	\$ 29,052	\$ 221,182

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (UNAUDITED)

14. Income Taxes

The Company's income tax provision on income before income taxes resulted in an effective tax rate of (46.0%) for the three months ended March 31, 2020, compared to an effective tax rate of 8.5% for the 2019 period. The Company's effective tax rate in the current year differed from the prior year period primarily due to the significant proportion of realized losses generated in lower tax jurisdictions.

The Company's effective tax rate, which is based upon the expected annual effective tax rate, may fluctuate from period to period based on the relative mix of income or loss reported by jurisdiction and the varying tax rates in each jurisdiction. For interim reporting purposes, the Company has calculated its annual effective tax rate for the full year 2020 by treating excess tax benefits in the U.S. that arise from the accounting for stock based compensation as a discrete item. The impact of the discrete item resulted in a benefit of 3.9% for the three months ended March 31, 2020.

The Company had a net deferred tax liability of \$8.0 million at March 31, 2020, compared to a net deferred tax liability of \$53.5 million at December 31, 2019. The change is primarily a result of the decline in the fair value of the Company's fixed maturities from December 31, 2019 to March 31, 2020. In addition, the Company paid \$7.4 million and recovered \$32.7 million of income taxes for the three months ended March 31, 2020 and 2019, respectively.

15. Legal Proceedings

The Company, in common with the insurance industry in general, is subject to litigation and arbitration in the normal course of its business. As of March 31, 2020, the Company was not a party to any litigation or arbitration which is expected by management to have a material adverse effect on the Company's results of operations and financial condition and liquidity.

16. Transactions with Related Parties

In 2017, the Company acquired approximately 25% of Premia Holdings Ltd. Premia Holdings Ltd. is the parent of Premia Reinsurance Ltd., a multi-line Bermuda reinsurance company (together with Premia Holdings Ltd., "Premia"). Premia's strategy is to reinsure or acquire companies or reserve portfolios in the non-life property and casualty insurance and reinsurance run-off market. Arch Re Bermuda and certain Arch co-investors invested \$100.0 million and acquired approximately 25% of Premia as well as warrants to purchase additional common equity. Arch has appointed two directors to serve on the seven person board of directors of Premia. Arch Re Bermuda is providing a 25% quota share reinsurance treaty on certain business written by Premia.

In the 2019 fourth quarter, Barbican Group Holdings Limited ("Barbican"), a wholly owned subsidiary of the Company, entered into certain reinsurance and related transactions with Premia pursuant to which Premia assumed a transfer of liability for the 2018 and prior years of account of Barbican as of July 1, 2019. Barbican recorded reinsurance recoverable on unpaid and paid losses and funds held liability of \$216.0 million and \$210.2 million, respectively, at March 31, 2020, compared to \$177.7 million and \$180.0 million, respectively, at December 31, 2019.

Certain directors and executive officers of the Company own common and preference shares of Watford. See [note 12, "Variable Interest Entity and Noncontrolling Interests,"](#) for information about Watford.

ITEM 2.MANAGEMENT’S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following is a discussion and analysis of our financial condition and results of operations. This should be read in conjunction with our consolidated financial statements included in Item 1 of this report and also our Management’s Discussion and Analysis of Financial Condition and Results of Operations contained in our Annual Report on Form 10-K for the year ended December 31, 2019 (“2019 Form 10-K”). In addition, readers should review “Risk Factors” set forth in Item 1A of Part I of our 2019 Form 10-K and [“ITEM 1A—Risk Factors”](#) of this Form 10-Q. Tabular amounts are in U.S. Dollars in thousands, except share amounts, unless otherwise noted.

Arch Capital Group Ltd. (“Arch Capital” and, together with its subsidiaries, “Arch”, “we” or “us”) is a Bermuda public limited liability company with approximately \$13.10 billion in capital at March 31, 2020 and, through operations in Bermuda, the United States, Europe, Canada, Australia and Hong Kong, writes insurance, reinsurance and mortgage insurance on a worldwide basis.

CURRENT OUTLOOK

The outbreak of COVID-19 began significantly impacting social and economic activity in the U.S. and global markets during the 2020 first quarter. We are committed to the safety of our employees, including restricting travel and instituting an extensive work from home policy. These actions have helped prevent a major disruption to our clients and operations. The impact of the spread of COVID-19, a developing recession and related levels of unemployment has changed some of our outlook for 2020, but we are entering this period with a strong capital base.

Recent investments in our property and casualty business are beginning to take form. We continue to look for opportunities to find acceptable books of business to underwrite without sacrificing underwriting discipline and continue to write a portion of our overall book in catastrophe-exposed business which has the potential to increase the volatility of our operating results. The extent to which COVID-19 impacts our business, results of operations and financial results will depend on numerous evolving factors including, but not limited to: the magnitude and duration of COVID-19, the extent to which it will impact macroeconomic conditions, the speed of the anticipated recovery and governmental, business and individual reactions to the pandemic. Given the daily evolution of the COVID-19 outbreak and the response to curb its spread, currently we are not able to estimate the effects of the COVID-19 outbreak to our results of operations, financial condition, or liquidity.

Given the unusual circumstances and breadth of the pandemic, we have classified COVID-19 losses as a catastrophe.

We recorded approximately \$87 million for COVID-19 losses across our insurance and reinsurance segment, split 41% to insurance and 59% to reinsurance. While it is still very early and we have extremely limited information to accurately quantify our potential exposure to the pandemic, we believe it was prudent to establish a certain level of IBNR reserves for occurrences through March 31, 2020, based on policy terms and conditions including limits, sub-limits, and deductibles. These reserves were recorded across a limited number of lines of business, such as trade credit and property where we have a very small number of policies that do not contain a specific pandemic exclusion and/or explicitly afford business interruption coverage under a pandemic.

We believe that the mortgage insurance industry enters this period of stress in a stronger position than it did back in 2007 at the beginning of the great financial crisis. Given the financial stress due to COVID-19 global pandemic, our mortgage segment’s combined ratio for the 2020 first quarter included 12.0 points of related losses. See “Results of Operations—Mortgage Segment” for further details on our mortgage operations.

As we look towards the remainder of 2020, in the U.S. we expect delinquency rates to increase progressively from the current level, as more borrowers request forbearance on their mortgage loans under the CARES Act. We expect to record loss reserves on these delinquencies, which will likely increase our levels of incurred losses over the coming quarters. Over time, we would expect many of these delinquencies to cure and revert back to performing loans as the economy returns to a less-stressed state. At this time, we do not have enough visibility to predictably forecast the rate at which forbearance delinquencies will be reported to us, cure or ultimately turn into claims on an annual, let alone a quarterly basis. That said, based on our current analysis which tells us that the pandemic will represent an earnings event for our mortgage segment and not a capital event, our current expectation is that our pre-tax underwriting income for the entire mortgage segment will be minimal for the remainder of 2020. However, there is likely to be variability in underwriting income between quarters based on the timing of receipt of notice of defaults. For further discussion of the potential impacts of COVID-19, see [“ITEM 1A—Risk Factors”](#).

Arch remains committed to providing solutions across many offerings as the marketplace evolves, including the mortgage credit risk transfer programs initiated by government sponsored

enterprises, or “GSEs.” Such programs have continued to generate business.

FINANCIAL MEASURES

Management uses the following three key financial indicators in evaluating our performance and measuring the overall growth in value generated for Arch Capital’s common shareholders:

Book Value per Share

Book value per share represents total common shareholders’ equity available to Arch divided by the number of common shares outstanding. Management uses growth in book value per share as a key measure of the value generated for our common shareholders each period and believes that book value per share is the key driver of Arch Capital’s share price over time. Book value per share is impacted by, among other factors, our underwriting results, investment returns and share repurchase activity, which has an accretive or dilutive impact on book value per share depending on the purchase price.

Book value per share was \$26.10 at March 31, 2020, compared to \$26.42 at December 31, 2019 and \$23.12 at March 31, 2019. The 1.2% decrease for the 2020 first quarter reflected the impact of negative total return on investments and losses related to COVID-19 exposures, while the 12.9% increase over the trailing twelve months reflected strong underwriting results and investment returns.

Operating Return on Average Common Equity

Operating return on average common equity (“Operating ROAE”) represents annualized after-tax operating income available to Arch common shareholders divided by the average of beginning and ending common shareholders’ equity available to Arch during the period. After-tax operating income available to Arch common shareholders, a non-GAAP financial measure as defined in Regulation G, represents net income available to Arch common shareholders, excluding net realized gains or losses (which includes changes in the allowance for credit losses on financial assets and net impairment losses recognized in earnings) equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other, loss on redemption of preferred shares and income taxes. Management uses Operating ROAE as a key measure of the return generated to common shareholders. See “Comment on Non-GAAP Financial Measures.”

Our Operating ROAE was 7.1% for the 2020 first quarter, compared to 12.3% for the 2019 first quarter. The 2020 first quarter return reflected the impact of losses related to COVID-19 exposures and lower investment income than in the 2019 first quarter.

Total Return on Investments

Total return on investments includes investment income, equity in net income or loss of investment funds accounted for using the equity method, net realized gains and losses (excluding changes in the allowance for credit losses on non-investment related financial assets) and the change in unrealized gains and losses generated by Arch’s investment portfolio. Total return is calculated on a pre-tax basis and before investment expenses, excludes amounts reflected in the ‘other’ segment, and reflects the effect of financial market conditions along with foreign currency fluctuations. In addition, total return incorporates the timing of investment returns during the periods. The following table summarizes our total return compared to the benchmark return against which we measured our portfolio during the periods. See “Comment on Non-GAAP Financial Measures.”

	Arch Portfolio	Benchmark Return
Pre-tax total return (before investment expenses):		
2020 First Quarter	(0.86)%	(4.55)%
2019 First Quarter	2.70 %	2.82 %

Total return for the 2020 first quarter reflected the impact of the COVID-19 global pandemic and the economic market conditions that followed, with negative returns on equities and non-investment grade fixed income securities. This impact was partially offset by positive returns on investment grade fixed income securities and derivatives which helped the Arch portfolio beat its benchmark return index in the 2020 first quarter.

The benchmark return index is a customized combination of indices intended to approximate a target portfolio by asset mix and average credit quality while also matching the approximate estimated duration and currency mix of our insurance and reinsurance liabilities. Although the estimated duration and average credit quality of this index will move as the duration and rating of its constituent securities change, generally we do not adjust the composition of the benchmark return index except to incorporate changes to the mix of liability currencies and durations noted above. The benchmark return index should not be interpreted as expressing a preference for or aversion to any particular sector or sector weight. The index is intended solely to provide, unlike many master indices that change based on the size of their constituent indices, a relatively stable basket of investable indices. At March 31, 2020, the benchmark return index had an average credit quality of “Aa3” by Moody’s Investors Service (“Moody’s”), and an estimated duration of 2.89 years.

The benchmark return index included weightings to the following indices:

	%
ICE BoAML 1-10 Year A - AAA U.S. Corporate Index	21.00%
ICE BoAML 1-5 Year U.S. Treasury Index	15.00
MSCI ACWI Net Total Return USD Index	8.60
ICE BoAML 3-5 Year Fixed Rate Asset Backed Securities Index	7.00
S&P Leveraged Loan Total Return Index	5.20
Bloomberg Barclays CMBS Invest Grade Aaa Total Return Index	5.00
ICE BoAML 1-10 Year BBB U.S. Corporate Index	4.00
ICE BoAML U.S. Mortgage Backed Securities Index	4.00
ICE BoAML 1-5 Year U.K. Gilt Index	4.00
ICE BoAML German Government 1-10 Year Index	3.50
ICE BoAML 0-3 Month U.S. Treasury Bill Index	3.25
ICE BoAML 1-10 Year U.S. Municipal Securities Index	3.00
ICE BoAML 5-10 Year U.S. Treasury Index	3.00
ICE BoAML 1-5 Year Australia Government Index	2.75
ICE BoAML U.S. High Yield Constrained Index	2.50
ICE BoAML 1-5 Year Canada Government Index	2.00
Bloomberg Barclays Global High Yield Total Return Index	1.50
Hedge Fund Research HFRX ED Distressed Restructuring Index	1.50
Dow Jones Global ex-US Select Real Estate Securities Total Return Net Index	0.90
FTSE Nareit All Mortgage Capped Index Total Return USD	0.90
Bloomberg Barclays CMBS: Erisa Eligible Unhedged USD	0.90
ICE BoAML 20+ Year Canada Government Index	0.50
Total	100.00%

COMMENT ON NON-GAAP FINANCIAL MEASURES

Throughout this filing, we present our operations in the way we believe will be the most meaningful and useful to investors, analysts, rating agencies and others who use our financial information in evaluating the performance of our company. This presentation includes the use of after-tax operating income available to Arch common shareholders, which is defined as net income available to Arch common shareholders, excluding net realized gains or losses (which includes changes in the allowance for credit losses on financial assets and net impairment losses recognized in earnings), equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other and income taxes, and the use of annualized operating return on average common equity. The presentation of after-tax operating income available to Arch common shareholders and annualized operating return on average common equity are non-GAAP financial measures as defined in Regulation G. The reconciliation of such measures to net income available to Arch common shareholders and annualized return on average common equity (the most directly comparable GAAP financial

measures) in accordance with Regulation G is included under “Results of Operations” below.

We believe that net realized gains or losses, equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses and transaction costs and other in any particular period are not indicative of the performance of, or trends in, our business. Although net realized gains or losses, equity in net income or loss of investment funds accounted for using the equity method and net foreign exchange gains or losses are an integral part of our operations, the decision to realize investment gains or losses, the recognition of the change in the carrying value of investments accounted for using the fair value option in net realized gains or losses, the recognition of net impairment losses, the recognition of equity in net income or loss of investment funds accounted for using the equity method and the recognition of foreign exchange gains or losses are independent of the insurance underwriting process and result, in large part, from general economic and financial market conditions. Furthermore, certain users of our financial information believe that, for many companies, the timing of the realization of investment gains or losses is largely opportunistic. In addition, changes in the allowance for credit losses and net impairment losses recognized in earnings on the Company’s investments represent other-than-temporary declines in expected recovery values on securities without actual realization. The use of the equity method on certain of our investments in certain funds that invest in fixed maturity securities is driven by the ownership structure of such funds (either limited partnerships or limited liability companies). In applying the equity method, these investments are initially recorded at cost and are subsequently adjusted based on our proportionate share of the net income or loss of the funds (which include changes in the market value of the underlying securities in the funds). This method of accounting is different from the way we account for our other fixed maturity securities and the timing of the recognition of equity in net income or loss of investment funds accounted for using the equity method may differ from gains or losses in the future upon sale or maturity of such investments. Transaction costs and other include advisory, financing, legal, severance, incentive compensation and other transaction costs related to acquisitions. We believe that transaction costs and other, due to their non-recurring nature, are not indicative of the performance of, or trends in, our business performance. Due to these reasons, we exclude net realized gains or losses, equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses and transaction costs and other from the calculation of after-tax operating income available to Arch common shareholders.

We believe that showing net income available to Arch common shareholders exclusive of the items referred to above reflects the underlying fundamentals of our business since we evaluate the performance of and manage our business to produce an underwriting profit. In addition to presenting net income

available to Arch common shareholders, we believe that this presentation enables investors and other users of our financial information to analyze our performance in a manner similar to how management analyzes performance. We also believe that this measure follows industry practice and, therefore, allows the users of financial information to compare our performance with our industry peer group. We believe that the equity analysts and certain rating agencies which follow us and the insurance industry as a whole generally exclude these items from their analyses for the same reasons.

Our segment information includes the presentation of consolidated underwriting income or loss and a subtotal of underwriting income or loss before the contribution from the ‘other’ segment. Such measures represent the pre-tax profitability of our underwriting operations and include net premiums earned plus other underwriting income, less losses and loss adjustment expenses, acquisition expenses and other operating expenses. Other operating expenses include those operating expenses that are incremental and/or directly attributable to our individual underwriting operations. Underwriting income or loss does not incorporate items included in our corporate (non-underwriting) segment. While these measures are presented in [note 4, “Segment Information,”](#) of the notes accompanying our consolidated financial statements, they are considered non-GAAP financial measures when presented elsewhere on a consolidated basis. The reconciliations of underwriting income or loss to income before income taxes (the most directly comparable GAAP financial measure) on a consolidated basis and a subtotal before the contribution from the ‘other’ segment, in accordance with Regulation G, is shown in [note 4, “Segment Information”](#) to our consolidated financial statements.

We measure segment performance for our three underwriting segments based on underwriting income or loss. We do not manage our assets by underwriting segment, with the exception of goodwill and intangibles and, accordingly, investment income and other non-underwriting related items are not allocated to each underwriting segment. For the ‘other’ segment, performance is measured based on net income or loss.

Along with consolidated underwriting income, we provide a subtotal of underwriting income or loss before the contribution from the ‘other’ segment. The ‘other’ segment includes the results of Watford Holdings Ltd. Watford Holdings Ltd. is the parent of Watford Re Ltd., a multi-line Bermuda reinsurance company (together with Watford Holdings Ltd., “Watford”). Pursuant to generally accepted accounting principles, Watford is considered a variable interest entity and we concluded that we are the primary beneficiary of Watford. As such, we consolidate the results of Watford in our consolidated financial statements, although we only own approximately 13% of Watford’s common equity. Watford’s own management and board of directors are responsible for its results and profitability. In addition, we do not guarantee or provide credit support for

Watford. Since Watford is an independent company, the assets of Watford can be used only to settle obligations of Watford and Watford is solely responsible for its own liabilities and commitments. Our financial exposure to Watford is limited to our investment in Watford’s senior notes, common and preferred shares and counterparty credit risk (mitigated by collateral) arising from the reinsurance transactions. We believe that presenting certain information excluding the ‘other’ segment enables investors and other users of our financial information to analyze our performance in a manner similar to how our management analyzes performance.

Our presentation of segment information includes the use of a current year loss ratio which excludes favorable or adverse development in prior year loss reserves. This ratio is a non-GAAP financial measure as defined in Regulation G. The reconciliation of such measure to the loss ratio (the most directly comparable GAAP financial measure) in accordance with Regulation G is shown on the individual segment pages. Management utilizes the current year loss ratio in its analysis of the underwriting performance of each of our underwriting segments.

Total return on investments includes investment income, equity in net income or loss of investment funds accounted for using the equity method, net realized gains and losses (excluding changes in the allowance for credit losses on non-investment related financial assets) and the change in unrealized gains and losses generated by Arch’s investment portfolio. Total return is calculated on a pre-tax basis and before investment expenses, excludes amounts reflected in the ‘other’ segment, and reflects the effect of financial market conditions along with foreign currency fluctuations. In addition, total return incorporates the timing of investment returns during the periods. There is no directly comparable GAAP financial measure for total return. Management uses total return on investments as a key measure of the return generated to Arch common shareholders, and compares the return generated by our investment portfolio against benchmark returns during the periods.

RESULTS OF OPERATIONS

The following table summarizes our consolidated financial data, including a reconciliation of net income or loss available to Arch common shareholders to after-tax operating income or loss available to Arch common shareholders. Each line item reflects the impact of our percentage ownership of Watford's common equity during such period.

	Three Months Ended	
	March 31,	
	2020	2019
Net income available to Arch common shareholders	\$ 133,714	\$ 438,125
Net realized (gains) losses	109,364	(114,335)
Equity in net (income) loss of investment funds accounted for using the equity method	4,209	(46,867)
Net foreign exchange (gains) losses	(64,491)	(4,994)
Transaction costs and other	2,595	1,190
Income tax expense (1)	4,365	2,778
After-tax operating income available to Arch common shareholders	\$ 189,756	\$ 275,897
Beginning common shareholders' equity	\$ 10,717,371	\$ 8,659,827
Ending common shareholders' equity	10,587,244	9,334,596
Average common shareholders' equity	\$ 10,652,308	\$ 8,997,212
Annualized return on average common equity %	5.0	19.5
Annualized operating return on average common equity %	7.1	12.3

(1) Income tax expense on net realized gains or losses, equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses and transaction costs and other reflects the relative mix reported by jurisdiction and the varying tax rates in each jurisdiction.

Segment Information

We classify our businesses into three underwriting segments — insurance, reinsurance and mortgage — and two other operating segments — corporate (non-underwriting) and 'other.' Our insurance, reinsurance and mortgage segments each have managers who are responsible for the overall profitability of their respective segments and who are directly accountable to our chief operating decision makers, the President and Chief Executive Officer of Arch Capital and the Chief Financial Officer of Arch Capital. The chief operating decision makers do not assess performance, measure return on equity or make resource allocation decisions on a line of business basis. Management measures segment performance for our three underwriting segments based on underwriting income or loss. We do not manage our assets by underwriting segment, with the exception of goodwill and intangible assets, and, accordingly, investment income is not allocated to each underwriting segment.

We determined our reportable segments using the management approach described in accounting guidance regarding

disclosures about segments of an enterprise and related information. The accounting policies of the segments are the same as those used for the preparation of our consolidated financial statements. Intersegment business is allocated to the segment accountable for the underwriting results.

Insurance Segment

The following tables set forth our insurance segment's underwriting results:

	Three Months Ended March 31,		
	2020	2019	% Change
Gross premiums written	\$ 1,207,645	\$ 941,954	28.2
Premiums ceded	(378,897)	(320,622)	
Net premiums written	828,748	621,332	33.4
Change in unearned premiums	(112,829)	(67,827)	
Net premiums earned	715,919	553,505	29.3
Losses and loss adjustment expenses	(507,108)	(356,723)	
Acquisition expenses	(107,337)	(82,824)	
Other operating expenses	(129,649)	(113,396)	
Underwriting income (loss)	\$ (28,175)	\$ 562	n/m
Underwriting Ratios			% Point Change
Loss ratio	70.8%	64.4%	6.4
Acquisition expense ratio	15.0%	15.0%	—
Other operating expense ratio	18.1%	20.5%	(2.4)
Combined ratio	103.9%	99.9%	4.0

The insurance segment consists of our insurance underwriting units which offer specialty product lines on a worldwide basis. Product lines include:

- *Construction and national accounts:* primary and excess casualty coverages to middle and large accounts in the construction industry and a wide range of products for middle and large national accounts, specializing in loss sensitive primary casualty insurance programs (including large deductible, self-insured retention and retrospectively rated programs).
- *Excess and surplus casualty:* primary and excess casualty insurance coverages, including middle market energy business, and contract binding, which primarily provides casualty coverage through a network of appointed agents to small and medium risks.
- *Lenders products:* collateral protection, debt cancellation and service contract reimbursement products to banks, credit unions, automotive dealerships and original equipment manufacturers and other specialty programs that pertain to automotive lending and leasing.
- *Professional lines:* directors' and officers' liability, errors and omissions liability, employment practices liability, fiduciary liability, crime, professional indemnity and other financial related coverages for corporate, private equity, venture

capital, real estate investment trust, limited partnership, financial institution and not-for-profit clients of all sizes and medical professional and general liability insurance coverages for the healthcare industry. The business is predominately written on a claims-made basis.

- *Programs:* primarily package policies, underwriting workers' compensation and umbrella liability business in support of desirable package programs, targeting program managers with unique expertise and niche products offering general liability, commercial automobile, inland marine and property business with minimal catastrophe exposure.

- *Property, energy, marine and aviation:* primary and excess general property insurance coverages, including catastrophe-exposed property coverage, for commercial clients. Coverages for marine include hull, war, specie and liability. Aviation and stand alone terrorism are also offered.

- *Travel, accident and health:* specialty travel and accident and related insurance products for individual, group travelers, travel agents and suppliers, as well as accident and health, which provides accident, disability and medical plan insurance coverages for employer groups, medical plan members, students and other participant groups.

- *Other:* includes alternative market risks (including captive insurance programs), excess workers' compensation and employer's liability insurance coverages for qualified self-insured groups, associations and trusts, and contract and commercial surety coverages, including contract bonds (payment and performance bonds) primarily for medium and large contractors and commercial surety bonds for Fortune 1,000 companies and smaller transaction business programs.

Premiums Written.

The following tables set forth our insurance segment's net premiums written by major line of business:

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Professional lines	\$ 169,118	20.4	\$ 129,234	20.8
Property, energy, marine and aviation	127,585	15.4	70,486	11.3
Travel, accident and health	126,046	15.2	88,104	14.2
Construction and national accounts	115,999	14.0	95,355	15.3
Programs	112,532	13.6	101,172	16.3
Excess and surplus casualty	65,419	7.9	45,165	7.3
Lenders products	33,292	4.0	22,415	3.6
Other	78,757	9.5	69,401	11.2
Total	\$ 828,748	100.0	\$ 621,332	100.0

Gross premiums written by the insurance segment in the 2020 first quarter were 28.2% higher than in the 2019 first quarter, while net premiums written were 33.4% higher. The higher level

of net premiums written reflected increases in most lines of business, primarily due to new business opportunities, rate increases and growth in existing accounts.

Net Premiums Earned.

The following tables set forth our insurance segment's net premiums earned by major line of business:

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Professional lines	\$ 151,700	21.2	\$ 114,791	20.7
Property, energy, marine and aviation	111,183	15.5	59,638	10.8
Travel, accident and health	77,375	10.8	71,575	12.9
Construction and national accounts	99,700	13.9	75,931	13.7
Programs	108,878	15.2	97,486	17.6
Excess and surplus casualty	65,097	9.1	42,369	7.7
Lenders products	25,343	3.5	23,232	4.2
Other	76,643	10.7	68,483	12.4
Total	\$ 715,919	100.0	\$ 553,505	100.0

Net premiums written are primarily earned on a pro rata basis over the terms of the policies for all products, usually 12 months. Net premiums earned in the 2020 first quarter were 29.3% higher than in the 2019 first quarter. Net premiums earned reflect changes in net premiums written over the previous five quarters.

Losses and Loss Adjustment Expenses.

The table below shows the components of the insurance segment's loss ratio:

	Three Months Ended	
	March 31,	
	2020	2019
Current year	71.0 %	65.2 %
Prior period reserve development	(0.2)%	(0.8)%
Loss ratio	70.8 %	64.4 %

Current Year Loss Ratio.

The insurance segment's current year loss ratio in the 2020 first quarter was 5.8 points higher than in the 2019 first quarter and reflected 6.9 points of current year catastrophic activity, which included 5.0 points for exposure through March 31, 2020 to the COVID-19 global pandemic. The 2019 first quarter reflected minimal catastrophic activity.

Prior Period Reserve Development.

The insurance segment's net favorable development was \$1.1 million, or 0.2 points, for the 2020 first quarter, compared to \$4.4 million, or 0.8 points, for the 2019 first quarter. See [note](#)

5. [“Reserve for Losses and Loss Adjustment Expenses.”](#) to our consolidated financial statements for information about the insurance segment’s prior year reserve development.

Underwriting Expenses.

The insurance segment’s underwriting expense ratio was 33.1% in the 2020 first quarter, compared to 35.5% in the 2019 first quarter, with the decrease due in part to growth in net premiums earned.

Reinsurance Segment

The following tables set forth our reinsurance segment’s underwriting results:

	Three Months Ended March 31,		
	2020	2019	% Change
Gross premiums written	\$ 1,122,519	\$ 682,855	64.4
Premiums ceded	(325,339)	(231,567)	
Net premiums written	797,180	451,288	76.6
Change in unearned premiums	(253,720)	(104,923)	
Net premiums earned	543,460	346,365	56.9
Other underwriting income	2,120	4,377	
Losses and loss adjustment expenses	(430,069)	(239,810)	
Acquisition expenses	(79,606)	(54,326)	
Other operating expenses	(45,297)	(35,704)	
Underwriting income	\$ (9,392)	\$ 20,902	(144.9)
			% Point Change
Underwriting Ratios			
Loss ratio	79.1%	69.2%	9.9
Acquisition expense ratio	14.6%	15.7%	(1.1)
Other operating expense ratio	8.3%	10.3%	(2.0)
Combined ratio	102.0%	95.2%	6.8

The reinsurance segment consists of our reinsurance underwriting units which offer specialty product lines on a worldwide basis. Product lines include:

- *Casualty*: provides coverage to ceding company clients on third party liability and workers’ compensation exposures from ceding company clients, primarily on a treaty basis. Exposures include, among others, executive assurance, professional liability, workers’ compensation, excess and umbrella liability, excess motor and healthcare business.
- *Marine and aviation*: provides coverage for energy, hull, cargo, specie, liability and transit, and aviation business, including airline and general aviation risks. Business written may also include space business, which includes coverages for satellite assembly, launch and operation for commercial space programs.
- *Other specialty*: provides coverage to ceding company clients for proportional motor and other lines, including surety, accident and health, workers’ compensation catastrophe, agriculture, trade credit and political risk.

- *Property catastrophe*: provides protection for most catastrophic losses that are covered in the underlying policies written by reinsureds, including hurricane, earthquake, flood, tornado, hail and fire, and coverage for other perils on a case-by-case basis. Property catastrophe reinsurance provides coverage on an excess of loss basis when aggregate losses and loss adjustment expense from a single occurrence or aggregation of losses from a covered peril exceed the retention specified in the contract.

- *Property excluding property catastrophe*: provides coverage for both personal lines and commercial property exposures and principally covers buildings, structures, equipment and contents. The primary perils in this business include fire, explosion, collapse, riot, vandalism, wind, tornado, flood and earthquake. Business is assumed on both a proportional and excess of loss treaty basis and on a facultative basis. In addition, facultative business is written which focuses on commercial property risks on an excess of loss basis.

- *Other*: includes life reinsurance business on both a proportional and non-proportional basis, casualty clash business and, in limited instances, non-traditional business which is intended to provide insurers with risk management solutions that complement traditional reinsurance.

Premiums Written.

The following tables set forth our reinsurance segment’s net premiums written by major line of business:

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Other Specialty	\$ 284,952	35.7	\$ 140,477	31.1
Casualty	190,880	23.9	168,484	37.3
Property excluding property catastrophe	158,924	19.9	102,740	22.8
Property catastrophe	89,092	11.2	3,383	0.7
Marine and aviation	49,785	6.2	15,958	3.5
Other	23,547	3.0	20,246	4.5
Total	\$ 797,180	100.0	\$ 451,288	100.0

Gross premiums written by the reinsurance segment in the 2020 first quarter were 64.4% higher than in the 2019 first quarter, while net premiums written were 76.6% higher. Premiums written for the reinsurance segment in the 2020 first quarter were affected by the presence of an \$88 million loss portfolio transfer contract, written and fully earned in the period in the other specialty line of business. Absent this transaction, gross and net premiums written would have been 51.5% and 57.2% higher than in the 2019 first quarter, respectively. The growth in net premiums written also reflected increases in most lines of business, primarily due to growth in existing accounts, new business, including premiums written through Barbican which was acquired in the 2019 fourth quarter, and rate increases.

Net Premiums Earned.

The following tables set forth our reinsurance segment's net premiums earned by major line of business:

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Other Specialty	\$ 203,385	37.4	\$ 121,521	35.1
Casualty	135,071	24.9	91,624	26.5
Property excluding property catastrophe	112,652	20.7	83,792	24.2
Property catastrophe	53,000	9.8	18,732	5.4
Marine and aviation	24,858	4.6	11,059	3.2
Other	14,494	2.7	19,637	5.7
Total	\$ 543,460	100.0	\$ 346,365	100.0

Net premiums written, irrespective of the class of business, are generally earned on a pro rata basis over the terms of the underlying policies or reinsurance contracts. Excluding the loss portfolio transfer contract, net premiums earned by the reinsurance segment in the 2020 first quarter were 31.6% higher than in the 2019 first quarter.

Other Underwriting Income (Loss).

Other underwriting income for the 2020 first quarter was \$2.1 million, compared to \$4.4 million for the 2019 first quarter.

Losses and Loss Adjustment Expenses.

The table below shows the components of the reinsurance segment's loss ratio:

	Three Months Ended March 31,	
	2020	2019
Current year	81.2 %	68.7%
Prior period reserve development	(2.1)%	0.5%
Loss ratio	79.1 %	69.2%

Current Year Loss Ratio.

The reinsurance segment's current year loss ratio in the 2020 first quarter was 12.5 points higher than in the 2019 first quarter and reflected 12.7 points of current year catastrophic activity, compared to 2.3 points in the 2019 first quarter. Catastrophic activity for the 2020 first quarter ratio included 9.3 points for exposure through March 31, 2020 to the COVID-19 pandemic, while the 2019 first quarter ratio included an increase in reserves on Typhoon Jebi of \$16.0 million. The balance of the change in the 2020 loss ratios resulted, in part, from changes in mix of business and the level of attritional losses.

Prior Period Reserve Development.

The reinsurance segment's net favorable development was \$11.6 million, or 2.1 points, for the 2020 first quarter, compared to \$1.7 million, or 0.5 points of adverse development, for the 2019 first quarter. See [note 5, "Reserve for Losses and Loss Adjustment Expenses."](#) to our consolidated financial statements for information about the reinsurance segment's prior year reserve development.

Underwriting Expenses.

The underwriting expense ratio for the reinsurance segment was 22.9% in the 2020 first quarter, compared to 26.0% in the 2019 first quarter, reflecting growth in net premiums earned.

Mortgage Segment

Our mortgage operations include U.S. and international mortgage insurance and reinsurance operations as well as participation in GSE credit risk-sharing transactions. Our mortgage group includes direct mortgage insurance in the U.S. primarily through Arch Mortgage Insurance Company and United Guaranty Residential Insurance Company (together, "Arch MI U.S."), mortgage reinsurance by Arch Reinsurance Ltd. ("Arch Re Bermuda") to mortgage insurers on both a proportional and non-proportional basis globally; direct mortgage insurance in Europe through Arch Insurance (EU) Designated Activity Company ("Arch MI Europe") and in Hong Kong through Arch MI Asia Limited ("Arch MI Asia"); and participation in various GSE credit risk-sharing products primarily through Arch Re Bermuda.

The following tables set forth our mortgage segment's underwriting results.

	Three Months Ended March 31,		
	2020	2019	% Change
Gross premiums written	\$ 368,945	\$ 356,050	3.6
Premiums ceded	(44,327)	(48,798)	
Net premiums written	324,618	307,252	5.7
Change in unearned premiums	20,408	15,650	
Net premiums earned	345,026	322,902	6.9
Other underwriting income	4,599	3,856	
Losses and loss adjustment expenses	(67,566)	(11,149)	
Acquisition expenses	(38,536)	(31,672)	
Other operating expenses	(45,896)	(39,875)	
Underwriting income	\$ 197,627	\$ 244,062	(19.0)
			% Point Change
Underwriting Ratios			
Loss ratio	19.6%	3.5%	16.1
Acquisition expense ratio	11.2%	9.8%	1.4
Other operating expense ratio	13.3%	12.3%	1.0
Combined ratio	44.1%	25.6%	18.5

Premiums Written.

The following tables set forth our mortgage segment's net premiums written by underwriting location (*i.e.*, where the business is underwritten):

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Underwriting location:				
United States	\$ 264,108	81.4	\$ 255,380	83.1
Other	60,510	18.6	51,872	16.9
Total	<u>\$ 324,618</u>	<u>100.0</u>	<u>\$ 307,252</u>	<u>100.0</u>

Gross premiums written by the mortgage segment in the 2020 first quarter were 3.6% higher than in the 2019 first quarter, while net premiums written were 5.7% higher. The growth in net premiums written primarily reflected an increase in monthly premium business due to growth in insurance in force and lower ceded premiums.

The persistency rate, which represents the percentage of mortgage insurance in force at the beginning of a 12-month period that remains in force at the end of such period, of the Arch MI U.S. portfolio of mortgage loans was 72.6% at March 31, 2020, compared to 75.7% at December 31, 2019.

Arch MI U.S. generated \$16.8 billion of new insurance written ("NIW") in the 2020 first quarter, compared to \$11.2 billion in the 2019 first quarter. NIW represents the original principal balance of all loans that received coverage during the period. Monthly premium policies contributed 93.5% of NIW in the 2020 first quarter, compared to 91.6% for the 2019 first quarter.

The following tables provide details on the NIW generated by Arch MI U.S.:

(U.S. Dollars in millions)

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Total new insurance written (NIW) (1)	\$ 16,778		\$ 11,207	
Credit quality (FICO):				
>=740	\$ 10,069	60.0	\$ 6,350	56.7
680-739	5,787	34.5	4,041	36.1
620-679	922	5.5	816	7.3
Total	<u>\$ 16,778</u>	<u>100.0</u>	<u>\$ 11,207</u>	<u>100.0</u>
Loan-to-value (LTV):				
95.01% and above	\$ 1,668	9.9	\$ 1,808	16.1
90.01% to 95.00%	7,199	42.9	4,975	44.4
85.01% to 90.00%	5,329	31.8	3,149	28.1
85.01% and below	2,582	15.4	1,275	11.4
Total	<u>\$ 16,778</u>	<u>100.0</u>	<u>\$ 11,207</u>	<u>100.0</u>
Monthly vs. single:				
Monthly	\$ 15,692	93.5	\$ 10,263	91.6
Single	1,086	6.5	944	8.4
Total	<u>\$ 16,778</u>	<u>100.0</u>	<u>\$ 11,207</u>	<u>100.0</u>
Purchase vs. refinance:				
Purchase	\$ 12,299	73.3	\$ 10,289	91.8
Refinance	4,479	26.7	918	8.2
Total	<u>\$ 16,778</u>	<u>100.0</u>	<u>\$ 11,207</u>	<u>100.0</u>

(1) Represents the original principal balance of all loans that received coverage during the period.

Net Premiums Earned.

The following tables set forth our mortgage segment's net premiums earned by underwriting location:

	Three Months Ended March 31,			
	2020		2019	
	Amount	%	Amount	%
Underwriting location:				
United States	\$ 289,162	83.8	\$ 274,473	85.0
Other	55,864	16.2	48,429	15.0
Total	<u>\$ 345,026</u>	<u>100.0</u>	<u>\$ 322,902</u>	<u>100.0</u>

Net premiums earned for the 2020 first quarter were 6.9% higher than in the 2019 first quarter. The increases were primarily due to growth in U.S. insurance in force over the last twelve months combined with a higher level of single premiums earned as a result of policy terminations due to mortgage refinance activity.

Other Underwriting Income.

Other underwriting income, which is primarily related to older GSE credit risk-sharing transactions receiving derivative accounting treatment, was \$4.6 million for the 2020 first quarter, compared to \$3.9 million for the 2019 first quarter.

Losses and Loss Adjustment Expenses.

The table below shows the components of the mortgage segment's loss ratio:

	Three Months Ended	
	March 31,	
	2020	2019
Current year	21.4 %	14.8 %
Prior period reserve development	(1.8)%	(11.3)%
Loss ratio	19.6 %	3.5 %

Current Year Loss Ratio.

The mortgage segment's current year loss ratio was 6.6 points higher in the 2020 first quarter than in the 2019 first quarter. The loss ratio for the 2020 first quarter reflected 12.0 points of losses which resulted from financial stress due to the COVID-19 global pandemic. These incurred losses are largely a result of loss reserving selections being set at the higher end of the range of indications across the mortgage segment as of March 31, 2020. Pursuant to GAAP, incurred losses are based only on reported delinquencies as of March 31, 2020 for the mortgage segment's U.S. primary insurance operations. The Company is not aware of any reported delinquencies being directly the result of recent events as of the end of the first quarter.

Prior Period Reserve Development.

The mortgage segment's net favorable development was \$6.1 million, or 1.8 points, for the 2020 first quarter, compared to \$36.6 million, or 11.3 points, for the 2019 first quarter. See [note 5, "Reserve for Losses and Loss Adjustment Expenses,"](#) to our consolidated financial statements for information about the mortgage segment's prior year reserve development.

Underwriting Expenses.

The underwriting expense ratio for the mortgage segment was 24.5% in the 2020 first quarter, compared to 22.1% in the 2019 first quarter. The higher ratio in the 2020 first quarter reflected higher incentive compensation costs.

Corporate (Non-Underwriting) Segment

The corporate (non-underwriting) segment results include net investment income, other income (loss), corporate expenses, transaction costs and other, amortization of intangible assets, interest expense, items related to our non-cumulative preferred shares, net realized gains or losses (which includes changes in the allowance for credit losses on financial assets and net impairment losses recognized in earnings), equity in net income or loss of investment funds accounted for using the equity method, net foreign exchange gains or losses and income taxes. Such amounts exclude the results of the 'other' segment.

Net Investment Income.

The components of net investment income were derived from the following sources:

	Three Months Ended	
	March 31,	
	2020	2019
Fixed maturities	\$ 101,763	\$ 110,651
Equity securities	5,630	2,246
Short-term investments	3,385	4,298
Other (1)	20,479	22,944
Gross investment income	131,257	140,139
Investment expenses (2)	(18,229)	(18,890)
Net investment income	\$ 113,028	\$ 121,249

- (1) Amounts include dividends and other distributions on investment funds, term loan investments, funds held balances, cash balances and other items.
- (2) Investment expenses were approximately 0.35% of average invested assets for the 2020 first quarter, compared to 0.38% for the 2019 first quarter.

The lower level of net investment income for the 2020 first quarter primarily related to lower yields available in the financial market. The pre-tax investment income yield, calculated based on amortized cost and on an annualized basis, was 2.20% for the 2020 first quarter, compare to 2.67% for the 2019 first quarter.

Corporate Expenses.

Corporate expenses were \$18.2 million for the 2020 first quarter, compared to \$16.8 million for the 2019 first quarter. The increase in corporate expenses primarily reflected higher professional fees and other costs.

Transaction Costs and Other.

Transaction costs and other were \$2.6 million for the 2020 first quarter, compared to \$1.2 million for the 2019 first quarter. Amounts in the 2020 period primarily related to recent acquisition activity.

Amortization of Intangible Assets.

Amortization of intangible assets for the 2020 first quarter was \$16.6 million, compared to \$20.4 million for the 2019 first quarter. Such expenses primarily related to the UGC acquisition and other acquisitions in late 2018 to 2019. See the consolidated financial statements contained in our 2019 Form 10-K for disclosures on our amortization pattern.

Interest Expense.

Interest expense was \$25.2 million for the 2020 first quarter, compared to the \$23.5 million for the 2019 first quarter. The increase in the 2020 period reflected an increase in funds held liabilities.

Net Realized Gains or Losses.

We recorded net realized losses of \$72.1 million for the 2020 first quarter, compared to net realized gains of \$111.1 million for the 2019 first quarter. Currently, our portfolio is actively managed to maximize total return within certain guidelines. The effect of financial market movements on the investment portfolio will directly impact net realized gains and losses as the portfolio is adjusted and rebalanced. Net realized gains or losses from the sale of fixed maturities primarily results from our decisions to reduce credit exposure, to change duration targets, to rebalance our portfolios or due to relative value determinations.

Net realized gains or losses also include realized and unrealized contract gains and losses on our derivative instruments, changes in the fair value of assets accounted for using the fair value option and in the fair value of equities, along with changes in the allowance for credit losses on financial assets, net impairment losses recognized in earnings and re-measurement of contingent consideration liability amounts. See [note 7, “Investment Information—Net Realized Gains \(Losses\).”](#) to our consolidated financial statements for additional information. See [note 7, “Investment Information—Allowance for Credit Losses.”](#) to our consolidated financial statements for additional information.

Equity in Net Income (Loss) of Investment Funds Accounted for Using the Equity Method.

We recorded a loss of \$4.2 million for equity in net income or loss related to investment funds accounted for using the equity method in the 2020 first quarter, compared to \$46.9 million of income for the 2019 first quarter. Such investments are generally recorded on a one to three month lag based on the availability of reports from the investment funds. Investment funds accounted for using the equity method totaled \$1.68 billion at March 31, 2020, compared to \$1.66 billion at December 31, 2019. See [note 7, “Investment Information—Investments Accounted For Using the Equity Method.”](#) to our consolidated financial statements for additional information.

Net Foreign Exchange Gains or Losses.

Net foreign exchange gains for the 2020 first quarter were \$63.3 million, compared to net foreign exchange gains for the 2019 first quarter of \$5.2 million. Amounts in both periods were primarily unrealized and resulted from the effects of revaluing our net insurance liabilities required to be settled in foreign currencies at each balance sheet date.

Income Tax Expense.

Our income tax provision on income (loss) before income taxes resulted in an expense of 13.6% for the 2020 first quarter, compared to 9.4% for the 2019 first quarter. Such amounts exclude the results of the ‘other’ segment. The effective tax

rates for the 2020 first quarter included a discrete income tax benefit of \$2.4 million related to share based compensation. Our effective tax rate, which is based upon the expected annual effective tax rate, may fluctuate from period to period based on the relative mix of income or loss reported by jurisdiction and the varying tax rates in each jurisdiction.

Other Segment

The ‘other’ segment includes the results of Watford. Pursuant to generally accepted accounting principles, Watford is considered a variable interest entity and we concluded that we are the primary beneficiary of Watford. As such, we consolidate the results of Watford in our consolidated financial statements, although we only own approximately 13% of Watford’s common equity. See [note 12, “Variable Interest Entities and Noncontrolling Interests.”](#) and [note 4, “Segment Information.”](#) to our consolidated financial statements for additional information on Watford.

CRITICAL ACCOUNTING POLICIES, ESTIMATES AND RECENT ACCOUNTING PRONOUNCEMENTS

Critical accounting policies, estimates and recent accounting pronouncements are discussed in Management’s Discussion and Analysis of Financial Condition and Results of Operations contained in our 2019 Form 10-K, updated where applicable in the notes accompanying our consolidated financial statements, including [note 1, “Basis of Presentation and Recent Accounting Pronouncements.”](#)

FINANCIAL CONDITION

Investable Assets

At March 31, 2020, total investable assets held by Arch were \$22.38 billion, excluding the \$2.50 billion included in the ‘other’ segment (*i.e.*, attributable to Watford).

Investable Assets Held by Arch

The following table summarizes the fair value of the investable assets held by Arch:

Investable assets (1):	Estimated Fair Value	% of Total
March 31, 2020		
Fixed maturities (2)	\$ 16,683,385	74.6
Short-term investments (2)	997,079	4.5
Cash	785,704	3.5
Equity securities (2)	1,148,639	5.1
Other investments (2)	1,153,737	5.2
Investments accounted for using the equity method	1,676,055	7.5
Securities transactions entered into but not settled at the balance sheet date	(68,747)	(0.3)
Total investable assets held by Arch	\$ 22,375,852	100.0

Average effective duration (in years)	3.19
Average S&P/Moody’s credit ratings (3)	AA/Aa2
Embedded book yield (4)	2.34%

December 31, 2019		
Fixed maturities (2)	\$ 16,894,021	75.8
Short-term investments (2)	1,004,257	4.5
Cash	623,793	2.8
Equity securities (2)	827,842	3.7
Other investments (2)	1,336,920	6.0
Investments accounted for using the equity method	1,660,396	7.5
Securities transactions entered into but not settled at the balance sheet date	(61,553)	(0.3)
Total investable assets held by Arch	\$ 22,285,676	100.0

Average effective duration (in years)	3.40
Average S&P/Moody’s credit ratings (3)	AA/Aa2
Embedded book yield (4)	2.55%

- (1) In securities lending transactions, we receive collateral in excess of the fair value of the securities pledged. For purposes of this table, we have excluded the collateral received under securities lending, at fair value and included the securities pledged under securities lending, at fair value.
- (2) Includes investments carried at fair value under the fair value option.
- (3) Average credit ratings on our investment portfolio on securities with ratings by Standard & Poor’s Rating Services (“S&P”) and Moody’s Investors Service (“Moody’s”).
- (4) Before investment expenses.

At March 31, 2020, approximately \$16.03 billion, or 71.6%, of total investable assets held by Arch were internally managed, compared to \$15.80 billion, or 70.9%, at December 31, 2019.

The following table summarizes our fixed maturities and fixed maturities pledged under securities lending agreements (“Fixed Maturities”) by type:

	Estimated Fair Value	% of Total
March 31, 2020		
Corporate bonds	\$ 6,678,007	40.0
Mortgage backed securities	449,024	2.7
Municipal bonds	860,593	5.2
Commercial mortgage backed securities	781,417	4.7
U.S. government and government agencies	4,309,804	25.8
Non-U.S. government securities	1,964,810	11.8
Asset backed securities	1,639,730	9.8
Total	\$ 16,683,385	100.0

December 31, 2019		
Corporate bonds	\$ 6,561,354	38.8
Mortgage backed securities	541,800	3.2
Municipal bonds	880,119	5.2
Commercial mortgage backed securities	734,244	4.3
U.S. government and government agencies	4,632,947	27.4
Non-U.S. government securities	1,995,813	11.8
Asset backed securities	1,547,744	9.2
Total	\$ 16,894,021	100.0

The following table provides the credit quality distribution of our Fixed Maturities. For individual fixed maturities, S&P ratings are used. In the absence of an S&P rating, ratings from Moody’s are used, followed by ratings from Fitch Ratings.

	Estimated Fair Value	% of Total
March 31, 2020		
U.S. government and gov’t agencies (1)	\$ 4,804,048	28.8
AAA	3,486,700	20.9
AA	1,994,127	12.0
A	3,937,053	23.6
BBB	1,565,912	9.4
BB	366,759	2.2
B	205,181	1.2
Lower than B	51,712	0.3
Not rated	271,893	1.6
Total	\$ 16,683,385	100.0

December 31, 2019		
U.S. government and gov’t agencies (1)	\$ 5,215,489	30.9
AAA	3,392,341	20.1
AA	2,115,828	12.5
A	3,849,458	22.8
BBB	1,495,467	8.9
BB	355,803	2.1
B	216,663	1.3
Lower than B	56,865	0.3
Not rated	196,107	1.2
Total	\$ 16,894,021	100.0

- (1) Includes U.S. government-sponsored agency residential mortgage-backed securities and agency commercial mortgage-backed securities.

[Table of Contents](#)

The following table provides information on the severity of the unrealized loss position as a percentage of amortized cost for all Fixed Maturities which were in an unrealized loss position:

Severity of gross unrealized losses:	Estimated Fair Value	Gross Unrealized Losses	% of Total Gross Unrealized Losses
March 31, 2020			
0-10%	\$ 4,816,094	\$ (157,556)	52.3
10-20%	682,411	(106,756)	35.4
20-30%	60,705	(19,804)	6.6
Greater than 30%	20,411	(17,142)	5.7
Total	\$ 5,579,621	\$ (301,258)	100.0
December 31, 2019			
0-10%	\$ 4,136,798	\$ (49,072)	95.3
10-20%	12,405	(1,796)	3.5
20-30%	830	(273)	0.5
Greater than 30%	315	(363)	0.7
Total	\$ 4,150,348	\$ (51,504)	100.0

The following table summarizes our top ten exposures to fixed income corporate issuers by fair value at March 31, 2020, excluding guaranteed amounts and covered bonds:

	Estimated Fair Value	Credit Rating (1)
Bank of America Corporation	\$ 267,690	A-/A2
Wells Fargo & Company	266,260	A-/A2
JPMorgan Chase & Co.	231,644	A-/A2
Apple Inc.	188,372	AA+/Aa1
Morgan Stanley	139,910	BBB+/A3
Citigroup Inc.	126,042	A-/A2
The Walt Disney Company	125,294	A/A2
BP p.l.c.	110,570	A-/A1
The Goldman Sachs Group, Inc.	108,376	BBB+/A3
Oracle Corporation	108,266	A+/A3
Total	\$ 1,672,424	

(1) Average credit ratings as assigned by S&P and Moody's, respectively.

The following table provides information on our structured securities, which includes residential mortgage-backed securities ("RMBS"), commercial mortgage-backed securities ("CMBS") and asset-backed securities ("ABS"):

	Agencies	Investment Grade	Below Investment Grade	Total
Mar 31, 2020				
RMBS	\$ 413,311	\$ 6,014	\$ 29,699	\$ 449,024
CMBS	80,933	654,819	45,665	781,417
ABS	—	1,585,648	54,082	1,639,730
Total	\$ 494,244	\$ 2,246,481	\$ 129,446	\$ 2,870,171
Dec 31, 2019				
RMBS	\$ 503,929	\$ 7,770	\$ 30,101	\$ 541,800
CMBS	78,612	629,424	26,208	734,244
ABS	—	1,483,449	64,295	1,547,744
Total	\$ 582,541	\$ 2,120,643	\$ 120,604	\$ 2,823,788

At March 31, 2020, our structured securities included \$37.7 million par value in sub-prime securities with a fair value of \$28.9 million and average credit quality ratings from S&P/Moody's of "CCC-/Caa3," compared to \$38.3 million par value with a fair value of \$30.6 million and average credit quality ratings of "CCC-/Caa3" at December 31, 2019.

The following table summarizes our equity securities, which include investments in exchange traded funds:

	March 31, 2020	December 31, 2019
Equities (1)	\$ 311,081	\$ 375,067
Exchange traded funds		
Fixed income (2)	474,870	7,237
Equity and other (3)	362,688	445,538
Total	\$ 1,148,639	\$ 827,842

- (1) Primarily in consumer non-cyclical, consumer cyclical, technology, communications and financial stocks at March 31, 2020.
- (2) Primarily in MBS, corporate and municipal strategies at March 31, 2020.
- (3) Primarily in large cap stocks and foreign equities at March 31, 2020.

[Table of Contents](#)

The following table summarizes our other investments which are included in investments accounted for using the fair value option, by strategy:

	March 31, 2020	December 31, 2019
Lending	\$ 544,308	\$ 602,841
Term loan investments	228,586	264,083
Energy	63,057	97,402
Credit related funds	111,874	123,020
Investment grade fixed income	137,370	151,594
Infrastructure	33,644	61,786
Private equity	20,602	18,915
Real estate	14,296	17,279
Total	\$ 1,153,737	\$ 1,336,920

For details on our investments accounted for using the equity method, see [note 7, “Investment Information—Investments Accounted For Using the Equity Method.”](#) to our consolidated financial statements.

Our investment strategy allows for the use of derivative instruments. We utilize various derivative instruments such as futures contracts to enhance investment performance, replicate investment positions or manage market exposures and duration risk that would be allowed under our investment guidelines if implemented in other ways. See [note 9, “Derivative Instruments.”](#) to our consolidated financial statements for additional disclosures related to derivatives.

Accounting guidance regarding fair value measurements addresses how companies should measure fair value when they are required to use a fair value measure for recognition or disclosure purposes under GAAP and provides a common definition of fair value to be used throughout GAAP. See [note 8, “Fair Value.”](#) to our consolidated financial statements for a summary of our financial assets and liabilities measured at fair value, segregated by level in the fair value hierarchy.

[Investable Assets in the ‘Other’ Segment](#)

Investable assets in the ‘other’ segment are managed by Watford. The board of directors of Watford establishes its investment policies and guidelines. Watford’s investments are accounted for using the fair value option with changes in the carrying value of such investments recorded in net realized gains or losses.

The following table summarizes investable assets in the ‘other’ segment:

	March 31, 2020	December 31, 2019
Investments accounted for using the fair value option:		
Other investments	\$ 937,680	\$ 1,092,396
Fixed maturities	392,453	416,592
Short-term investments	343,861	329,303
Equity securities	58,092	59,799
Total	1,732,086	1,898,090
Fixed maturities available for sale, at fair value	677,869	706,875
Equity securities, at fair value	63,169	65,337
Cash	96,580	102,437
Securities sold but not yet purchased	(30,076)	(66,257)
Securities transactions entered into but not settled at the balance sheet date	(37,039)	(1,893)
Total investable assets included in ‘other’ segment	\$ 2,502,589	\$ 2,704,589

[Reinsurance](#)

The effects of reinsurance on written and earned premiums and losses and loss adjustment expenses (“LAE”) with unaffiliated reinsurers were as follows:

	Three Months Ended	
	March 31,	
	2020	2019
Premiums written:		
Direct	\$ 1,688,798	\$ 1,363,506
Assumed	1,144,032	714,373
Ceded	(695,584)	(552,620)
Net	\$ 2,137,246	\$ 1,525,259
Premiums earned:		
Direct	\$ 1,545,825	\$ 1,266,063
Assumed	761,074	533,279
Ceded	(562,455)	(430,476)
Net	\$ 1,744,444	\$ 1,368,866
Losses and LAE:		
Direct	\$ 985,083	\$ 616,062
Assumed	545,869	338,400
Ceded	(415,533)	(235,930)
Net	\$ 1,115,419	\$ 718,532

See [note 6, “Allowance for Expected Credit Losses.”](#) to our consolidated financial statements for information about our reinsurance recoverables and related allowance for credit losses.

[Bellemeade Re](#)

We have entered into various aggregate excess of loss mortgage reinsurance agreements with various special purpose reinsurance companies domiciled in Bermuda (the

“Bellemeade Agreements”). For the respective coverage periods, we will retain the first layer of the respective aggregate losses and the special purpose reinsurance companies will provide second layer coverage up to the outstanding coverage amount. We will then retain losses in excess of the outstanding coverage limit. The aggregate excess of loss reinsurance coverage decreases over a ten-year period as the underlying covered mortgages amortize.

The following table summarizes the respective coverages and retentions at March 31, 2020:

	Initial Coverage at Issuance	Coverage at Mar. 31, 2020	First Layer Retention
Bellemeade 2017-1 Ltd. (1)	\$ 368,114	\$ 190,324	\$ 165,652
Bellemeade 2018-1 Ltd. (2)	374,460	299,909	168,510
Bellemeade 2018-2 Ltd. (3)	653,278	380,986	352,258
Bellemeade 2018-3 Ltd. (4)	506,110	383,268	179,331
Bellemeade 2019-1 Ltd. (5)	341,790	228,940	208,046
Bellemeade 2019-2 Ltd. (6)	621,022	462,057	221,794
Bellemeade 2019-3 Ltd. (7)	700,920	603,465	232,093
Bellemeade 2019-4 Ltd. (8)	577,267	563,160	162,357
Total	\$ 4,142,961	\$ 3,112,109	\$ 1,690,041

- (1) Issued in October 2017, covering in-force policies issued between January 1, 2017 and June 30, 2017.
- (2) Issued in April 2018, covering in-force policies issued between July 1, 2017 and December 31, 2017.
- (3) Issued in August 2018, covering in-force policies issued between April 1, 2013 and December 31, 2015.
- (4) Issued in October 2018, covering in-force policies issued between January 1, 2018 and June 30, 2018.
- (5) Issued in March 2019, covering in-force policies primarily issued between 2005-2008 under United Guaranty Residential Insurance Company (“UGRIC”); as well as policies issued through 2015 under both UGRIC and Arch Mortgage Insurance Company.
- (6) Issued in April 2019, covering in-force policies issued between July 1, 2018 and December 31, 2018.
- (7) Issued in July 2019, covering in-force policies issued in 2016.
- (8) Issued in October 2019, covering in-force policies issued between January 1, 2019 and June 30, 2019.

Reserve for Losses and Loss Adjustment Expenses

We establish reserve for losses and loss adjustment expenses (“Loss Reserves”) which represent estimates involving actuarial and statistical projections, at a given point in time, of our expectations of the ultimate settlement and administration costs of losses incurred. Estimating Loss Reserves is inherently difficult, which is exacerbated by the fact that we have relatively limited historical experience upon which to base such estimates. We utilize actuarial models as well as available historical insurance industry loss ratio experience and loss development patterns to assist in the establishment of Loss Reserves. Actual losses and loss adjustment expenses paid will deviate, perhaps substantially, from the reserve estimates reflected in our financial statements.

At March 31, 2020 and December 31, 2019, our Loss Reserves, net of unpaid losses and loss adjustment expenses recoverable, by type and by operating segment were as follows:

	March 31, 2020	December 31, 2019
Insurance segment:		
Case reserves	\$ 1,626,058	\$ 1,601,627
IBNR reserves	3,541,959	3,403,051
Total net reserves	5,168,017	5,004,678
Reinsurance segment:		
Case reserves	1,403,792	1,273,523
Additional case reserves	159,972	166,251
IBNR reserves	1,935,726	1,835,993
Total net reserves	3,499,490	3,275,767
Mortgage segment:		
Case reserves	247,766	266,030
IBNR reserves	208,236	157,712
Total net reserves (1)	456,002	423,742
Other segment:		
Case reserves	501,107	478,036
Additional case reserves	5,598	29,059
IBNR reserves	609,252	597,910
Total net reserves	1,115,957	1,105,005
Total:		
Case reserves	3,778,723	3,619,216
Additional case reserves	165,570	195,310
IBNR reserves	6,295,173	5,994,666
Total net reserves	\$ 10,239,466	\$ 9,809,192

- (1) At March 31, 2020, total net reserves include \$287.0 million from U.S. primary mortgage insurance business, of which 56.1% represents policy years 2010 and prior and the remainder from later policy years. At December 31, 2019, total net reserves include \$278.7 million from U.S. primary mortgage insurance business, of which 58.2% represents policy years 2010 and prior and the remainder from later policy years.

At March 31, 2020 and December 31, 2019, the insurance segment’s Loss Reserves by major line of business, net of unpaid losses and loss adjustment expenses recoverable, were as follows:

	March 31, 2020	December 31, 2019
Insurance segment:		
Professional lines (1)	\$ 1,347,333	\$ 1,322,969
Construction and national accounts	1,282,120	1,248,750
Excess and surplus casualty (2)	601,344	564,254
Programs	587,511	571,926
Property, energy, marine and aviation	400,605	371,822
Travel, accident and health	118,754	109,613
Lenders products	27,387	28,233
Other (3)	802,963	787,111
Total net reserves	\$ 5,168,017	\$ 5,004,678

- (1) Includes professional liability, executive assurance and healthcare business.
- (2) Includes casualty and contract binding business.
- (3) Includes alternative markets, excess workers’ compensation and surety business.

[Table of Contents](#)

At March 31, 2020 and December 31, 2019, the reinsurance segment's Loss Reserves by major line of business, net of unpaid losses and loss adjustment expenses recoverable, were as follows:

	March 31, 2020	December 31, 2019
Reinsurance segment:		
Casualty (1)	\$ 1,845,832	\$ 1,796,073
Other specialty (2)	748,824	649,309
Property excluding property catastrophe	504,005	471,775
Marine and aviation	176,987	160,930
Property catastrophe	131,343	113,565
Other (3)	92,499	84,115
Total net reserves	<u>\$ 3,499,490</u>	<u>\$ 3,275,767</u>

- (1) Includes executive assurance, professional liability, workers' compensation, excess motor, healthcare and other.
(2) Includes non-excess motor, surety, accident and health, workers' compensation catastrophe, agriculture, trade credit and other.
(3) Includes life, casualty clash and other.

Mortgage Operations Supplemental Information

The mortgage segment's insurance in force ("IIF") and risk in force ("RIF") were as follows at March 31, 2020 and December 31, 2019:

(U.S. Dollars in millions)

	March 31, 2020		December 31, 2019	
	Amount	%	Amount	%
Insurance In Force (IIF) (1):				
U.S. primary mortgage insurance	\$ 284,203	68.9	\$ 287,150	68.7
Mortgage reinsurance	24,335	5.9	26,768	6.4
Other (2)	103,731	25.2	104,346	24.9
Total	<u>\$ 412,269</u>	<u>100.0</u>	<u>\$ 418,264</u>	<u>100.0</u>
Risk In Force (RIF) (3):				
U.S. primary mortgage insurance	\$ 72,566	92.0	\$ 73,388	91.9
Mortgage reinsurance	1,961	2.5	2,129	2.7
Other (2)	4,387	5.6	4,380	5.5
Total	<u>\$ 78,914</u>	<u>100.0</u>	<u>\$ 79,897</u>	<u>100.0</u>

- (1) Represents the aggregate dollar amount of each insured mortgage loan's current principal balance.
(2) Includes GSE credit risk-sharing transactions and international insurance business.
(3) Represents the aggregate dollar amount of each insured mortgage loan's current principal balance multiplied by the insurance coverage percentage specified in the policy for insurance policies issued and after contract limits and/or loss ratio caps for credit risk-sharing or reinsurance transactions.

The insurance in force and risk in force for our U.S. primary mortgage insurance business by policy year were as follows at March 31, 2020:

(U.S. Dollars in millions)	IIF		RIF		Delinquency
	Amount	%	Amount	%	Rate (1)
Policy year:					
2010 and prior	\$ 16,352	5.8	\$ 3,763	5.2	8.17%
2011	1,533	0.5	422	0.6	1.80%
2012	5,777	2.0	1,604	2.2	0.86%
2013	11,265	4.0	3,156	4.3	0.92%
2014	12,733	4.5	3,511	4.8	1.14%
2015	23,866	8.4	6,395	8.8	0.81%
2016	38,155	13.4	9,997	13.8	1.01%
2017	40,621	14.3	10,454	14.4	0.96%
2018	47,068	16.6	11,914	16.4	0.91%
2019	70,130	24.7	17,246	23.8	0.21%
2020	16,703	5.9	4,104	5.7	0.01%
Total	<u>\$ 284,203</u>	<u>100.0</u>	<u>\$ 72,566</u>	<u>100.0</u>	<u>1.42%</u>

- (1) Represents the ending percentage of loans in default.

The insurance in force and risk in force for our U.S. primary mortgage insurance business by policy year were as follows at December 31, 2019:

(U.S. Dollars in millions)	IIF		RIF		Delinquency
	Amount	%	Amount	%	Rate (1)
Policy year:					
2010 and prior	\$ 17,251	6.0	\$ 3,990	5.4	8.79%
2011	1,678	0.6	464	0.6	1.59%
2012	6,293	2.2	1,753	2.4	0.89%
2013	12,276	4.3	3,433	4.7	0.99%
2014	13,714	4.8	3,778	5.1	1.16%
2015	25,788	9.0	6,880	9.4	0.87%
2016	40,898	14.2	10,670	14.5	1.03%
2017	43,896	15.3	11,262	15.3	1.00%
2018	51,776	18.0	13,086	17.8	0.86%
2019	73,580	25.6	18,072	24.6	0.14%
Total	<u>\$ 287,150</u>	<u>100.0</u>	<u>\$ 73,388</u>	<u>100.0</u>	<u>1.54%</u>

- (1) Represents the ending percentage of loans in default.

[Table of Contents](#)

The following tables provide supplemental disclosures on risk in force for our U.S. primary mortgage insurance business at March 31, 2020 and December 31, 2019:

(U.S. Dollars in millions)

	March 31, 2020		December 31, 2019	
	Amount	%	Amount	%
Credit quality (FICO):				
>=740	\$ 41,738	57.5	\$ 42,301	57.6
680-739	25,078	34.6	25,240	34.4
620-679	5,368	7.4	5,444	7.4
<620	382	0.5	403	0.5
Total	\$ 72,566	100.0	\$ 73,388	100.0
Weighted average FICO score	743		743	

Loan-to-value (LTV):

95.01% and above	\$ 9,060	12.5	\$ 9,064	12.4
90.01% to 95.00%	39,594	54.6	40,136	54.7
85.01% to 90.00%	20,619	28.4	20,890	28.5
85.00% and below	3,293	4.5	3,298	4.5
Total	\$ 72,566	100.0	\$ 73,388	100.0
Weighted average LTV	93.0%		93.0%	

Total RIF, net of external reinsurance

\$ 58,693	\$ 58,512
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(U.S. Dollars in millions)

	March 31, 2020		December 31, 2019	
	Amount	%	Amount	%
Total RIF by State:				
Texas	\$ 5,683	7.8	\$ 5,678	7.7
California	5,106	7.0	5,187	7.1
Florida	3,863	5.3	3,887	5.3
Georgia	2,819	3.9	2,753	3.8
Virginia	2,814	3.9	2,881	3.9
Illinois	2,621	3.6	2,616	3.6
Minnesota	2,509	3.5	2,514	3.4
North Carolina	2,475	3.4	2,470	3.4
Washington	2,426	3.3	2,474	3.4
Maryland	2,376	3.3	2,437	3.3
Others	39,874	54.9	40,491	55.2
Total	\$ 72,566	100.0	\$ 73,388	100.0

The following table provides supplemental disclosures for our U.S. primary mortgage insurance business related to insured loans and loss metrics:

(U.S. Dollars in thousands, except policy, loan and claim count)

	Three Months Ended March 31,	
	2020	2019
Roll-forward of insured loans in default:		
Beginning delinquent number of loans	20,163	20,665
New notices	9,419	9,711
Cures	(10,541)	(9,706)
Paid claims	(627)	(843)
Ending delinquent number of loans (1)	18,414	19,827
Ending number of policies in force (1)	1,293,799	1,286,877
Delinquency rate (1)	1.42%	1.54%
Losses:		
Number of claims paid	627	843
Total paid claims	\$ 26,038	\$ 33,494
Average per claim	\$ 41.5	\$ 39.7
Severity (2)	92.8%	98.9%
Average case reserve per default (in thousands)	\$ 14.4	\$ 16.6

(1) Includes first lien primary and pool policies.

(2) Represents total paid claims divided by RIF of loans for which claims were paid.

The risk-to-capital ratio, which represents total current (non-delinquent) risk in force, net of reinsurance, divided by total statutory capital, for Arch MI U.S. was approximately 11.3 to 1 at March 31, 2020, compared to 12.0 to 1 at December 31, 2019.

Shareholders' Equity and Book Value per Share

Total shareholders' equity available to Arch was \$11.37 billion at March 31, 2020, compared to \$11.50 billion at December 31, 2019. The decrease primarily reflected the impact of negative total return on investments and losses related to COVID-19 market volatility.

The following table presents the calculation of book value per share:

(U.S. dollars in thousands, except share data)	March 31, 2020	December 31, 2019
Total shareholders' equity available to Arch	\$ 11,367,244	\$ 11,497,371
Less preferred shareholders' equity	780,000	780,000
Common shareholders' equity available to Arch	\$ 10,587,244	\$ 10,717,371
Common shares and common share equivalents outstanding, net of treasury shares (1)	405,609,867	405,619,201
Book value per share	\$ 26.10	\$ 26.42

(1) Excludes the effects of 18,257,290 and 18,853,018 stock options and 1,438,347 and 1,586,779 restricted stock units outstanding at March 31, 2020 and December 31, 2019, respectively.

LIQUIDITY

Our liquidity and capital resources were not materially impacted by COVID-19 during the first quarter of 2020. For further discussion of the risks related to our potential future impacts of COVID-19 on our liquidity and capital resources, see “ITEM 1A—Risk Factors”.

This section does not include information specific to Watford. We do not guarantee or provide credit support for Watford, and our financial exposure to Watford is limited to our investment in Watford’s senior notes, common and preferred shares and counterparty credit risk (mitigated by collateral) arising from reinsurance transactions with Watford.

Liquidity is a measure of our ability to access sufficient cash flows to meet the short-term and long-term cash requirements of our business operations.

Arch Capital is a holding company whose assets primarily consist of the shares in its subsidiaries. Generally, Arch Capital depends on its available cash resources, liquid investments and dividends or other distributions from its subsidiaries to make payments, including the payment of debt service obligations and operating expenses it may incur and any dividends or liquidation amounts with respect to our preferred and common shares.

For the three months ended March 31, 2020, Arch Capital received dividends of \$107.5 million from Arch Re Bermuda, our Bermuda-based reinsurer and insurer, which can pay approximately \$2.99 billion to Arch Capital during the remainder of 2020 without providing an affidavit to the Bermuda Monetary Authority (“BMA”).

We expect that our liquidity needs, including our anticipated (re)insurance obligations and operating and capital expenditure needs, for the next twelve months, will be met by funds generated from underwriting activities and investment income, as well as by our balance of cash, short-term investments, proceeds on the sale or maturity of our investments, and our credit facilities.

Cash Flows

The following table summarizes our cash flows from operating, investing and financing activities, excluding amounts related to the ‘other’ segment (*i.e.*, Watford). See [note 12, “Variable Interest Entities and Noncontrolling Interests,”](#) for cash flows related to Watford.

	Three Months Ended	
	March 31,	
	2020	2019
Total cash provided by (used for):		
Operating activities	\$ 585,956	\$ 165,411
Investing activities	(242,766)	(188,853)
Financing activities	(146,856)	13,055
Effects of exchange rate changes on foreign currency cash	(23,738)	3,188
Increase (decrease) in cash and restricted cash	\$ 172,596	\$ (7,199)

- Cash provided by operating activities for the three months ended March 31, 2020 reflected a higher level of premiums collected than in the 2019 period. In addition, the 2019 period reflected a retroactive reinsurance transaction with a third party reinsurer.

- Cash used for investing activities for the three months ended March 31, 2020 was higher than in the 2019 period, reflecting a higher level of securities purchased.

- Cash used for financing activities for the three months ended March 31, 2020 was higher than the cash provided in the 2019 period, reflecting \$75.5 million of repurchases under our share repurchase program and a reduction in security lending.

CAPITAL RESOURCES

This section does not include information specific to Watford. We do not guarantee or provide credit support for Watford, and our financial exposure to Watford is limited to our investment in Watford’s senior notes, common and preferred shares and counterparty credit risk (mitigated by collateral) arising from reinsurance transactions with Watford.

The following table provides an analysis of our capital structure:

(U.S. dollars in thousands, except share data)

	Mar 31, 2020	Dec 31, 2019
Senior notes	\$ 1,734,384	\$ 1,734,209
Shareholders' equity available to Arch:		
Series E non-cumulative preferred shares	\$ 450,000	\$ 450,000
Series F non-cumulative preferred shares	330,000	330,000
Common shareholders' equity	10,587,244	10,717,371
Total	\$ 11,367,244	\$ 11,497,371
Total capital available to Arch	\$ 13,101,628	\$ 13,231,580
Debt to total capital (%)	13.2	13.1
Preferred to total capital (%)	6.0	5.9
Debt and preferred to total capital (%)	19.2	19.0

Arch MI U.S. is required to maintain compliance with the GSEs requirements, known as the Private Mortgage Insurer Eligibility Requirements or "PMIERs." The financial requirements require an eligible mortgage insurer's available assets, which generally include only the most liquid assets of an insurer, to meet or exceed "minimum required assets" as of each quarter end. Minimum required assets are calculated from PMIERs tables with several risk dimensions (including origination year, original loan-to-value and original credit score of performing loans, and the delinquency status of non-performing loans) and are subject to a minimum amount. Arch MI U.S. satisfied the PMIERs' financial requirements as of March 31, 2020 with an estimated PMIER sufficiency ratio of 165%, compared to 161% at December 31, 2019.

Arch Capital, through its subsidiaries, provides financial support to certain of its insurance subsidiaries and affiliates, through certain reinsurance arrangements beneficial to the ratings of such subsidiaries. Historically, our insurance, reinsurance and mortgage insurance subsidiaries have entered into separate reinsurance arrangements with Arch Re Bermuda covering individual lines of business. The reinsurance agreements between our U.S.-based property casualty insurance and reinsurance subsidiaries and Arch Re Bermuda were canceled on a cutoff basis as of January 1, 2018. In 2019, certain reinsurance agreements between our insurance subsidiaries and Arch Re Bermuda were reinstated.

GUARANTOR INFORMATION

The below table provides a description of our senior notes payable at March 31, 2020, excluding amounts attributable to the 'other' segment (*i.e.*, Watford):

Issuer/Due	Interest (Fixed)	Principal Amount	Carrying Amount
Arch Capital:			
May 1, 2034	7.350%	\$ 300,000	\$ 297,282
Arch-U.S.:			
Nov. 1, 2043 (1)	5.144%	500,000	494,858
Arch Finance:			
Dec. 15, 2026 (1)	4.011%	500,000	496,905
Dec. 15, 2046 (1)	5.031%	450,000	445,339
Total		\$ 1,750,000	\$ 1,734,384

(1) Fully and unconditionally guaranteed by Arch Capital.

Our senior notes were issued by Arch Capital, Arch-U.S. and Arch Capital Finance LLC ("Arch Finance"). Arch-U.S. is a wholly-owned subsidiary of Arch Capital and Arch Finance is a wholly-owned finance subsidiary of Arch-U.S. Our 2034 senior notes are unsecured obligations and ranked equally with all of its existing and future senior unsecured indebtedness. The 2043 senior notes issued by Arch-U.S. are unsecured and unsubordinated obligations of Arch-U.S. and Arch Capital, respectively, and rank equally and ratably with the other unsecured and unsubordinated indebtedness of Arch-U.S. and Arch Capital, respectively. The 2026 senior notes and 2046 senior notes issued by Arch Finance are unsecured and unsubordinated obligations of Arch Finance and Arch Capital, respectively, and rank equally and ratably with the other unsecured and unsubordinated indebtedness of Arch Finance and Arch Capital, respectively.

Arch-U.S. and Arch Finance depend on their available cash resources, liquid investments and dividends or other distributions from their subsidiaries or affiliates to make payments, including the payment of debt service obligations and operating expenses they may incur.

The following tables present condensed financial information for Arch Capital (parent guarantor) and Arch-U.S. (subsidiary issuer):

	March 31, 2020		December 31, 2019	
	Arch Capital	Arch-U.S.	Arch Capital	Arch-U.S.
Assets				
Total investments	\$ 156	\$ 659,327	\$ 42	\$ 692,606
Cash	6,620	53,134	18,113	54,518
Investments in subsidiaries	11,658,127	4,378,196	11,786,861	4,347,806
Due from subsidiaries and affiliates	—	201,412	17	200,635
Other assets	20,443	32,833	20,461	32,187
Total assets	<u>\$ 11,685,346</u>	<u>\$ 5,324,902</u>	<u>\$ 11,825,494</u>	<u>\$ 5,327,752</u>
Liabilities				
Senior notes	297,282	494,858	297,254	494,831
Due to subsidiaries and affiliates	—	542,220	—	536,805
Other liabilities	20,820	32,932	30,869	33,267
Total liabilities	<u>318,102</u>	<u>1,070,010</u>	<u>328,123</u>	<u>1,064,903</u>
Shareholders' Equity				
Total shareholders' equity available to Arch	<u>11,367,244</u>	<u>4,254,892</u>	<u>11,497,371</u>	<u>4,262,849</u>
Total shareholders' equity	<u>11,367,244</u>	<u>4,254,892</u>	<u>11,497,371</u>	<u>4,262,849</u>
Total liabilities, noncontrolling interests and shareholders' equity	<u>\$ 11,685,346</u>	<u>\$ 5,324,902</u>	<u>\$ 11,825,494</u>	<u>\$ 5,327,752</u>
	Three Months Ended		Year Ended	
	March 31, 2020		December 31, 2019	
	Arch Capital	Arch-U.S.	Arch Capital	Arch-U.S.
Revenues				
Net investment income	\$ 53	\$ 4,375	\$ 212	\$ 14,270
Net realized gains (losses)	—	(42,564)	—	25,313
Equity in net income (loss) of investments accounted for using the equity method	—	771	—	779
Other income (loss)	(66)	—	(762)	—
Total revenues	<u>(13)</u>	<u>(37,418)</u>	<u>(550)</u>	<u>40,362</u>
Expenses				
Corporate expenses	16,760	2,244	62,701	7,221
Interest expense	5,540	11,873	22,154	47,951
Net foreign exchange (gains) losses	3	—	1	—
Total expenses	<u>22,303</u>	<u>14,117</u>	<u>84,856</u>	<u>55,172</u>
Income (loss) before income taxes	<u>(22,316)</u>	<u>(51,535)</u>	<u>(85,406)</u>	<u>(14,810)</u>
Income tax (expense) benefit	—	11,116	—	3,696
Income (loss) before equity in net income of subsidiaries	<u>(22,316)</u>	<u>(40,419)</u>	<u>(85,406)</u>	<u>(11,114)</u>
Equity in net income of subsidiaries	166,433	118,300	1,721,725	564,657
Net income available to Arch	<u>144,117</u>	<u>77,881</u>	<u>1,636,319</u>	<u>553,543</u>
Preferred dividends	(10,403)	—	(41,612)	—
Net income available to Arch common shareholders	<u>\$ 133,714</u>	<u>\$ 77,881</u>	<u>\$ 1,594,707</u>	<u>\$ 553,543</u>

SHARE REPURCHASE PROGRAM

The board of directors of Arch Capital has authorized the investment in Arch Capital's common shares through a share repurchase program. For the three months ended March 31, 2020, Arch Capital repurchased 2.6 million shares under the share repurchase program with an aggregate purchase price of \$75.5 million. Since the inception of the share repurchase program through March 31, 2020, Arch Capital has repurchased 388.9 million common shares for an aggregate purchase price of \$4.04 billion. At March 31, 2020, approximately \$924.5 million of share repurchases were available under the program, which may be effected from time to time in open market or privately negotiated transactions through December 31, 2021. The timing and amount of the repurchase transactions under this program will depend on a variety of factors, including market conditions and corporate and regulatory considerations. We will continue to monitor our share price and, depending upon results of operations, market conditions and the development of the economy, as well as other factors, we will consider share repurchases on an opportunistic basis.

CATASTROPHIC EVENTS AND SEVERE ECONOMIC EVENTS

We have large aggregate exposures to natural and man-made catastrophic events, pandemic events like COVID-19 and severe economic events. Catastrophes can be caused by various events, including hurricanes, floods, windstorms, earthquakes, hailstorms, tornadoes, explosions, severe winter weather, fires, droughts and other natural disasters. Catastrophes can also cause losses in non-property business such as mortgage insurance, workers' compensation or general liability. In addition to the nature of property business, we believe that economic and geographic trends affecting insured property, including inflation, property value appreciation and geographic concentration, tend to generally increase the size of losses from catastrophic events over time.

Our models employ both proprietary and vendor-based systems and include cross-line correlations for property, marine, offshore energy, aviation, workers compensation and personal accident. We seek to limit the probable maximum pre-tax loss to a specific level for severe catastrophic events. Currently, we seek to limit our 1-in-250 year return period net probable maximum loss from a severe catastrophic event in any geographic zone to approximately 25% of tangible shareholders' equity available to Arch (total shareholders' equity available to Arch less goodwill and intangible assets). We reserve the right to change this threshold at any time.

Based on in-force exposure estimated as of April 1, 2020, our modeled peak zone catastrophe exposure was a windstorm affecting the Florida Tri-County, with a net probable maximum

pre-tax loss of \$680 million, followed by windstorms affecting Northeastern U.S. and the Gulf of Mexico regions with net probable maximum pre-tax losses of \$583 and \$568 million, respectively. Our exposures to other perils, such as U.S. earthquake and international events, were less than the exposures arising from U.S. windstorms and hurricanes. As of April 1, 2020, our modeled peak zone earthquake exposure (San Francisco earthquake) represented approximately 63% of our peak zone catastrophe exposure, and our modeled peak zone international exposure (Japan earthquake) was substantially less than both our peak zone windstorm and earthquake exposures.

Effective January 1, 2020, our insurance operations had in effect a reinsurance program which provided coverage for certain property-catastrophe related losses equal to \$256 million in excess of various retentions per occurrence.

We also have significant exposure to losses due to mortgage defaults resulting from severe economic events in the future. For our U.S. mortgage insurance business, we have developed a proprietary risk model ("Realistic Disaster Scenario" or "RDS") that simulates the maximum loss resulting from a severe economic downturn impacting the housing market. The RDS models the collective impact of adverse conditions for key economic indicators, the most significant of which is a decline in home prices. The RDS model projects paths of future home prices, unemployment rates, income levels and interest rates and assumes correlation across states and geographic regions. The resulting future performance of our in-force portfolio is then estimated under the economic stress scenario, reflecting loan and borrower information.

Currently, we seek to limit our modeled RDS loss from a severe economic event to approximately 25% of tangible shareholders' equity available to Arch. We reserve the right to change this threshold at any time. Based on in-force exposure estimated as of April 1, 2020, our modeled RDS loss was approximately 8% of tangible shareholders' equity available to Arch.

Net probable maximum loss estimates are net of expected reinsurance recoveries, before income tax and before excess reinsurance reinstatement premiums. RDS loss estimates are net of expected reinsurance recoveries and after income tax. Catastrophe loss estimates are reflective of the zone indicated and not the entire portfolio. Since hurricanes and windstorms can affect more than one zone and make multiple landfalls, our catastrophe loss estimates include clash estimates from other zones. Our catastrophe loss estimates and RDS loss estimates do not represent our maximum exposures and it is highly likely that our actual incurred losses would vary materially from the modeled estimates. There can be no assurances that we will not suffer pre-tax losses greater than 25% of our tangible shareholders' equity from one or more catastrophic events or severe economic events due to several factors, including the inherent uncertainties in estimating the frequency and severity

of such events and the margin of error in making such determinations resulting from potential inaccuracies and inadequacies in the data provided by clients and brokers, the modeling techniques and the application of such techniques or as a result of a decision to change the percentage of shareholders' equity exposed to a single catastrophic event or severe economic event. In addition, actual losses may increase if our reinsurers fail to meet their obligations to us or the reinsurance protections purchased by us are exhausted or are otherwise unavailable. See "Risk Factors—Risks Relating to Our Industry" and "Management's Discussion and Analysis of Financial Condition and Results of Operations—Catastrophic Events and Severe Economic Events" in our 2019 Form 10-K, updated where applicable in ["ITEM 1A—Risk Factors"](#)

OFF-BALANCE SHEET ARRANGEMENTS

Off-balance sheet arrangements are discussed in Management's Discussion and Analysis of Financial Condition and Results of Operations contained in our 2019 Form 10-K.

MARKET SENSITIVE INSTRUMENTS AND RISK MANAGEMENT

In accordance with the SEC's Financial Reporting Release No. 48, we performed a sensitivity analysis to determine the effects that market risk exposures could have on the future earnings, fair values or cash flows of our financial instruments as of March 31, 2020. Market risk represents the risk of changes in the fair value of a financial instrument and is comprised of several components, including liquidity, basis and price risks. We have not included Watford in the following analyses as we do not guarantee or provide credit support for Watford, and our financial exposure to Watford is limited to our investment in Watford's senior notes, common and preferred shares and counterparty credit risk (mitigated by collateral) arising from reinsurance transactions.

An analysis of material changes in market risk exposures at March 31, 2020 that affect the quantitative and qualitative disclosures presented in our 2019 Form 10-K (see section captioned "Management's Discussion and Analysis of Financial Condition and Results of Operations—Market Sensitive Instruments and Risk Management") were as follows:

Investment Market Risk

Fixed Income Securities. We invest in interest rate sensitive securities, primarily debt securities. We consider the effect of interest rate movements on the fair value of our fixed maturities, fixed maturities pledged under securities lending agreements, short-term investments and certain of our other investments which invest in fixed income securities and the corresponding change in unrealized appreciation. As interest rates rise, the fair value of our interest rate sensitive securities falls, and the converse is also true. Based on historical observations, there is

a low probability that all interest rate yield curves would shift in the same direction at the same time. Furthermore, at times interest rate movements in certain credit sectors exhibit a much lower correlation to changes in U.S. Treasury yields. Accordingly, the actual effect of interest rate movements may differ materially from the amounts set forth in the following tables.

The following table summarizes the effect that an immediate, parallel shift in the interest rate yield curve would have had on our fixed income securities:

(U.S. dollars in billions)	Interest Rate Shift in Basis Points				
	-100	-50	—	+50	+100
Mar 31, 2020					
Total fair value	\$ 21.05	\$ 20.73	\$ 20.44	\$ 20.07	\$ 19.75
Change from base	3.0%	1.4%		(1.8)%	(3.4)%
Change in unrealized value	\$ 0.61	\$ 0.29		\$ (0.37)	\$ (0.70)
Dec 31, 2019					
Total fair value	\$ 21.54	\$ 21.19	\$ 20.83	\$ 20.48	\$ 20.13
Change from base	3.4%	1.7%		(1.7)%	(3.4)%
Change in unrealized value	\$ 0.71	\$ 0.35		\$ (0.35)	\$ (0.71)

In addition, we consider the effect of credit spread movements on the market value of our fixed maturities, fixed maturities pledged under securities lending agreements, short-term investments and certain of our other investments and investment funds accounted for using the equity method which invest in fixed income securities and the corresponding change in unrealized value. As credit spreads widen, the fair value of our fixed income securities falls, and the converse is also true. In periods where the spreads on our fixed income securities are much higher than their historical average due to short-term market dislocations, such as at March 31, 2020, a parallel shift in credit spread levels would result in a much more pronounced change in unrealized value.

The following table summarizes the effect that an immediate, parallel shift in credit spreads in a static interest rate environment would have had on our fixed income securities:

(U.S. dollars in billions)	Credit Spread Shift in Percentage Points				
	-100	-50	—	+50	+100
Mar 31, 2020					
Total fair value	\$ 21.42	\$ 20.93	\$ 20.44	\$ 19.95	\$ 19.46
Change from base	4.8%	2.4%		(2.4)%	(4.8)%
Change in unrealized value	\$ 0.98	\$ 0.49		\$ (0.49)	\$ (0.98)
Dec 31, 2019					
Total fair value	\$ 21.19	\$ 21.02	\$ 20.83	\$ 20.65	\$ 20.48
Change from base	1.7%	0.9%		(0.9)%	(1.7)%
Change in unrealized value	\$ 0.35	\$ 0.19		\$ (0.19)	\$ (0.35)

Another method that attempts to measure portfolio risk is Value-at-Risk (“VaR”). VaR measures the worst expected loss under normal market conditions over a specific time interval at a given confidence level. The 1-year 95th percentile parametric VaR reported herein estimates that 95% of the time, the portfolio loss in a one-year horizon would be less than or equal to the calculated number, stated as a percentage of the measured portfolio’s initial value. The VaR is a variance-covariance based estimate, based on linear sensitivities of a portfolio to a broad set of systematic market risk factors and idiosyncratic risk factors mapped to the portfolio exposures. The relationships between the risk factors are estimated using historical data, and the most recent data points are generally given more weight. As of March 31, 2020, our portfolio’s VaR was estimated to be 13.20% compared to an estimated 3.19% at December 31, 2019. In periods where the volatility of the risk factors mapped to our portfolio’s exposures is higher due to market conditions, such as at March 31, 2020, the resulting VaR is higher than in other periods.

Equity Securities. At March 31, 2020 and December 31, 2019, the fair value of our investments in equity securities totaled \$1.15 billion and \$827.8 million, respectively. These investments are exposed to price risk, which is the potential loss arising from decreases in fair value. An immediate hypothetical 10% decline in the value of each position would reduce the fair value of such investments by approximately \$114.9 million and \$82.8 million at March 31, 2020 and December 31, 2019, respectively, and would have decreased book value per share by approximately \$0.28 and \$0.20, respectively. An immediate hypothetical 10% increase in the value of each position would increase the fair value of such investments by approximately \$114.9 million and \$82.8 million at March 31, 2020 and December 31, 2019, respectively, and would have increased book value per share by approximately \$0.28 and \$0.20, respectively.

Investment-Related Derivatives. At March 31, 2020, the notional value of all derivative instruments (excluding to-be-announced mortgage backed securities which are included in the fixed income securities analysis above and foreign currency forward contracts which are included in the foreign currency exchange risk analysis below) was \$5.11 billion, compared to \$8.04 billion at December 31, 2019. If the underlying exposure of each investment-related derivative held at March 31, 2020 depreciated by 100 basis points, it would have resulted in a reduction in net income of approximately \$51.1 million, and a decrease in book value per share of approximately \$0.13 per share, compared to \$80.4 million and \$0.20 per share, respectively, on investment-related derivatives held at December 31, 2019. If the underlying exposure of each investment-related derivative held at March 31, 2020 appreciated by 100 basis points, it would have resulted in an increase in net income of approximately \$51.1 million, and an increase in book value per share of approximately \$0.13 per share, compared to \$80.4 million and \$0.20 per share,

respectively, on investment-related derivatives held at December 31, 2019. See [note 9, “Derivative Instruments,”](#) to our consolidated financial statements for additional disclosures concerning derivatives.

For further discussion on investment activity, please refer to “Financial Condition—Investable Assets.”

Foreign Currency Exchange Risk

Foreign currency rate risk is the potential change in value, income and cash flow arising from adverse changes in foreign currency exchange rates. Through our subsidiaries and branches located in various foreign countries, we conduct our insurance and reinsurance operations in a variety of local currencies other than the U.S. Dollar. We generally hold investments in foreign currencies which are intended to mitigate our exposure to foreign currency fluctuations in our net insurance liabilities. We may also utilize foreign currency forward contracts and currency options as part of our investment strategy. See [note 9, “Derivative Instruments,”](#) to our consolidated financial statements for additional information.

The following table provides a summary of our net foreign currency exchange exposures, as well as foreign currency derivatives in place to manage these exposures:

(U.S. dollars in thousands, except per share data)	March 31, 2020	December 31, 2019
Net assets (liabilities), denominated in foreign currencies, excluding shareholders’ equity and derivatives	\$ (373,764)	\$ 265,501
Shareholders’ equity denominated in foreign currencies (1)	700,469	744,690
Net foreign currency forward contracts outstanding (2)	(114,838)	81,731
Net exposures denominated in foreign currencies	\$ 211,867	\$ 1,091,922
Pre-tax impact of a hypothetical 10% appreciation of the U.S. Dollar against foreign currencies:		
Shareholders’ equity	\$ (21,187)	\$ (109,192)
Book value per share	\$ (0.05)	\$ (0.27)
Pre-tax impact of a hypothetical 10% decline of the U.S. Dollar against foreign currencies:		
Shareholders’ equity	\$ 21,187	\$ 109,192
Book value per share	\$ 0.05	\$ 0.27

- (1) Represents capital contributions held in the foreign currencies of our operating units.
(2) Represents the net notional value of outstanding foreign currency forward contracts.

Although we generally attempt to match the currency of our projected liabilities with investments in the same currencies, from time to time we may elect to over or underweight one or more currencies, which could increase our exposure to foreign currency fluctuations and increase the volatility of our

shareholders' equity. Historical observations indicate a low probability that all foreign currency exchange rates would shift against the U.S. Dollar in the same direction and at the same time and, accordingly, the actual effect of foreign currency rate movements may differ materially from the amounts set forth above. For further discussion on foreign exchange activity, please refer to "Results of Operations."

Effects of Inflation

We do not believe that inflation has had a material effect on our consolidated results of operations, except insofar as inflation may affect our reserve for losses and loss adjustment expenses and interest rates. The potential exists, after a catastrophe loss or pandemic events like COVID-19, for the development of inflationary pressures in a local economy. The anticipated effects of inflation on us are considered in our catastrophe loss models. The actual effects of inflation on our results cannot be accurately known until claims are ultimately settled.

OTHER FINANCIAL INFORMATION

The consolidated financial statements as of March 31, 2020 and for the three month period ended March 31, 2020 and 2019 have been reviewed by PricewaterhouseCoopers LLP, the registrant's independent public accountants, whose report is included as an exhibit to this filing. The report of PricewaterhouseCoopers LLP states that they did not audit and they do not express an opinion on that unaudited financial information. Accordingly, the degree of reliance on their report on such information should be restricted in light of the limited nature of the review procedures applied. PricewaterhouseCoopers LLP is not subject to the liability provisions of Section 11 of the Securities Act of 1933 for their report on the unaudited financial information because that report is not a "report" or a "part" of the registration statement prepared or certified by PricewaterhouseCoopers LLP within the meaning of Sections 7 and 11 of the Securities Act of 1933.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Reference is made to the information appearing above under the subheading "Market Sensitive Instruments and Risk Management" under the caption "Management's Discussion and Analysis of Financial Condition and Results of Operations," which information is hereby incorporated by reference.

ITEM 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

In connection with the filing of this Form 10-Q, our management, including the Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness of disclosure controls and procedures pursuant to applicable Exchange Act Rules as of the end of the period covered by this report. Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that the disclosure controls and procedures were effective as of the end of and during the period covered by this report with respect to information being recorded, processed, summarized and reported within time periods specified in the SEC's rules and forms and with respect to timely communication to them and other members of management responsible for preparing periodic reports of all material information required to be disclosed in this report as it relates to Arch Capital and its consolidated subsidiaries.

We continue to enhance our operating procedures and internal controls to effectively support our business and our regulatory and reporting requirements. Our management does not expect that our disclosure controls or our internal controls will prevent all errors and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. As a result of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within the company have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons or by collusion of two or more people. The design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with the policies or procedures may deteriorate. As a result of the inherent limitations in a cost-effective control system, misstatement due to error or fraud may occur and not be detected. Accordingly, our disclosure controls and procedures are designed to provide reasonable, not absolute, assurance that the disclosure controls and procedures are met.

Changes in Internal Controls Over Financial Reporting

There have been no changes in internal control over financial reporting that occurred during the quarter ended March 31, 2020 that have materially affected, or are reasonably likely to materially affect, internal control over financial reporting. We have not experienced any material impact to our internal controls over financial reporting despite the fact that most of our employees are working remotely due to the COVID-19. We are continually monitoring and assessing COVID-19 situation on our internal controls to minimize the impact on their design and operating effectiveness.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

We, in common with the insurance industry in general, are subject to litigation and arbitration in the normal course of our business. As of March 31, 2020, we were not a party to any litigation or arbitration which is expected by management to have a material adverse effect on our results of operations and financial condition and liquidity.

ITEM 1A. RISK FACTORS

Our business is subject to a number of risks, including those identified in Part I—Item 1A of our 2019 Form 10-K, that could have a material adverse effect on our business, results of operations, financial condition and/or liquidity and that could cause our operating results to vary significantly from period to period. The risks described in our 2019 Form 10-K are not the only risks we face. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial also could have a material adverse effect on our business, results of operations, financial condition and/or liquidity. Other than as described below, there have been no material changes to the risk factors disclosed in Part I—Item 1A of our 2019 Form 10-K.

The impact of COVID-19 and related risks could materially affect our results of operations, financial position and/or liquidity.

The continuing global pandemic related to the novel coronavirus COVID-19 has impacted the global economy, financial markets and our results of operations. In addition, COVID-19 could materially disrupt the business operations of third parties with whom we interact. Because of the size and breadth of this pandemic, all of the direct and indirect consequences of COVID-19 are not yet known and may not emerge for some time.

The pandemic could have a significant effect on our Company's business, results of operations, and current and future financial performance. We may experience higher levels of loss and claims activity in certain lines of business and our premiums written and earned could also be adversely affected by a suppression of global commercial activity that results in a reduction in insurable assets and other exposure. Conditions of the financial markets resulting from the virus may also have a negative effect on the value and quality of the assets we hold within our portfolio of invested assets, thereby adversely affecting our investment income and increasing our credit and related risk. Certain lines of our business may require additional forms of collateral in the event of a decline in the fair value of securities and benchmarks to which those repayment mechanisms are linked. The continued impacts of the pandemic to the financial markets may also adversely affect our ability to fund through public or private equity offerings, debt financings, and through other means at acceptable terms. For a further discussion, see *"We could face unanticipated losses from war, terrorism, cyber-attacks, pandemics and political instability, and these or other unanticipated losses could have a material adverse effect on our financial condition and results of operations"* and *"Emerging claim and coverage issues may adversely affect our business"* included in "Part I-Item 1A-Risk Factors" in our 2019 Form 10-K.

The disruption in the financial markets related to COVID-19 has contributed to net realized losses, primarily due to the impact of changes in fair value on our equity investments and, to a lesser extent, our fixed-income investment portfolio. Our corporate fixed income portfolio may be adversely impacted by ratings downgrades, increased bankruptcies and credit spread widening in distressed industries, such as energy, gaming, lodging and leisure, autos, airlines and retail. In addition, in recent years, many state and local governments have been operating under deficits or projected deficits. These deficits may be exacerbated by the costs of responding to COVID-19 and reduced tax revenues due to adverse economic conditions. The severity and duration of these deficits could have an adverse impact on the collectability and valuation of our municipal bond portfolio. Our investment portfolio also includes residential mortgage-backed securities, commercial mortgage-backed securities and commercial mortgage loans, all of which could be adversely impacted by declines in real estate valuations and/or financial market disruption, including a heightened collection risk on the underlying mortgages and on rent receivables. Further disruptions in global financial markets due to the continuing impact of COVID-19 could result in additional net realized investment losses, including potential impairments in our fixed income portfolio. In addition, declines in fixed income yields would result in decreases in net investment income from future investment activity, including re-investments. Furthermore, issuers of the investments we hold under the equity method of accounting report their financial information to us one month to three months following

the end of the reporting period. Accordingly, the adverse impact of the recent disruption in global financial markets on equity method income from these investments is not reflected in our results for the 2020 first quarter, and we expect that equity method income from these investments could be significantly negative in the 2020 second quarter. Further disruptions in global financial markets could adversely impact our net investment income in future periods from its non-fixed income investment portfolio. For further discussion of the risks related to our investment portfolio see *“We may be adversely affected by changes in economic conditions, including interest rate changes”* and *“The determination of the amount of allowances and impairments taken on our investments is highly subjective and could materially impact our results of operations or financial position”* included in “Part I—Item 1A—Risk Factors” in our 2019 Form 10-K.

Governmental, regulatory and rating actions in response to the COVID-19 pandemic may adversely affect our financial performance and our ability to conduct our businesses as we have in the past.

Federal, state and local government actions in the U.S. and other countries where we do business to address and mitigate the impact of COVID-19 may adversely affect us. For example, we are potentially subject to legislative and/or regulatory action that seeks to retroactively mandate coverage for losses which our insurance policies were not designed or priced to cover. Currently, in some states there is proposed legislation to require insurers to cover business interruption claims irrespective of terms, exclusions or other conditions included in the policies that would otherwise preclude coverage. In addition, a number of states have instituted, and other states are considering instituting, changes designed to effectively expand workers' compensation coverage by creating presumptions of compensability of claims for certain types of workers. Regulatory restrictions or requirements could also impact pricing, risk selection and our rights and obligations with respect to our policies and insureds, including our ability to cancel policies or our right to collect premiums. At least one state regulator has issued an order requiring insurers to issue premium refunds, and regulators in other states could take similar actions. Many insurers, including us, have also voluntarily provided, and may further provide, premium refunds to their customers. It is also possible that changes in economic conditions and steps taken by federal, state and local governments in response to COVID-19 could require an increase in taxes at the federal, state and local levels, which would adversely impact our results of operations.

We expect the pandemic to result in a material increase in new defaults as borrowers fail to make timely payments on their mortgages, including as a result of entering mortgage forbearance programs that allow borrowers to defer mortgage payments, which may impact our eligible insurers' ability to remain compliant with the Private Mortgage Insurers Eligibility

Requirements (“PMIERS”) financial requirements. On March 18, 2020, the Federal Housing Finance Agency (“FHFA”) directed Fannie Mae and Freddie Mac (the “GSEs”), the primary purchasers of mortgages insured by the Company, to suspend foreclosures and evictions for at least 60 days and to provide payment forbearance to borrowers impacted by COVID-19. On March 27, 2020, the Coronavirus Aid, Relief, and Economic Security Act (“CARES Act”) was enacted. The CARES Act suspends foreclosures and evictions for at least 60 days from March 18, 2020, on mortgages purchased or securitized by the GSEs. In addition, the CARES Act provides for payment forbearance for up to 360 days to borrowers experiencing a hardship during the COVID-19 emergency.

Consistent with the CARES Act, the GSEs will provide a forbearance plan to any borrower who requests a forbearance with an attestation of the financial hardship caused by the COVID-19 emergency; and no additional documentation other than the borrower's attestation to a financial hardship caused by the COVID-19 emergency is required. It is unclear how many borrowers will obtain forbearance plans, the length of assistance borrowers will require, and whether borrowers will be able to resume their mortgage payments thereafter. Increases in unemployment as well as borrowers entering into forbearance plans will result in higher notices of delinquency (“NODs”) which may have an adverse impact on our results or operations. In addition, as a result of COVID-19-related relief programs, the defaults related to the pandemic, if not cured, could remain in our defaulted loan inventory for a protracted period of time, potentially resulting in higher levels of claim severity for those loans that ultimately result in a claim. There may be additional, extended or extensive forbearance programs or other changes in regulations or laws which may adversely impact our mortgage insurance segment.

When a borrower obtains a forbearance plan and does not make their mortgage payment for two consecutive months, the servicer will report the NOD with a special code that indicates the loan is subject to a COVID-19 related forbearance plan. Under PMIERS, eligible insurers are required to hold additional risk-based required assets for delinquent mortgages. However, this amount is reduced for mortgages backed by a property located in a FEMA Declared Major Disaster Area that are either 1) subject to a forbearance plan executed in response to a FEMA Declared Major Disaster Area eligible for Individual Assistance, or 2) has an initial default date occurring up to either (i) 30 days prior to or (ii) 90 days following the Major Disaster event. FEMA has issued Major Disaster Area declarations in all states related to COVID-19, noting the incident date as January 20, 2020. It is unclear whether the GSEs will provide updated PMIERS guidance related to the risk-based required asset factor applicable to delinquencies and forbearance plans related to COVID-19 or the application of the incident date. In addition, the Company is reliant on the accurate reporting of servicers to correctly identify which NODs are subject to COVID-19 related forbearance plans.

The rating agencies continually review the financial strength ratings assigned to the Company and its subsidiaries, and the ratings are subject to change. The COVID-19 pandemic and its impact on financial results and condition, could cause one or more of the rating agencies to downgrade the ratings assigned to the Company and its subsidiaries.

The disruption and other effects caused by COVID-19 could adversely impact our business operations, which could adversely affect our financial performance and results.

To protect our employees and in response to the global and regional restrictions on interpersonal contact and travel because of the COVID-19 pandemic, our work force (other than a small percentage of workers performing services which require them to visit the office) is working remotely, placing increased demands on our IT systems. Remote working arrangements may increase the risk of cyber-security attacks or data security incidents. While we have continued to conduct our business effectively, there is no assurance that our ability to continue to function in this new environment will not be adversely affected by an extended period of limited access to our physical facilities or by other developments such as an extended disruption to our systems that support our remote work capability. We depend on third-party platforms and other infrastructure to provide certain of our products and services, and such third-party infrastructures face similar risks. In addition, the continuation of the COVID-19 pandemic may continue to adversely affect our business operations, including our ability to carry on business development activities and unavailability of employees due to illness or quarantines, among others. For a further discussion, see *“Our information technology systems may be unable to meet the demands of customers”* and *“Technology breaches or failures, including, but not limited to, those resulting from a malicious cyber-attack on us or our business partners and service providers, could disrupt or otherwise negatively impact our business and/or expose us to litigation”* included in “Part I—Item 1A-Risk Factors” in our 2019 Form 10-K.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

The following table summarizes our purchases of common shares for the 2020 first quarter:

Period	Issuer Purchases of Equity Securities			
	Total Number of Shares Purchased (1)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet be Purchased Under the Plan or Programs (2)
1/1/2020 - 1/31/2020	34,418	\$ 43.87	—	\$ 1,000,000
2/1/2020 - 2/29/2020	135,852	42.35	—	\$ 1,000,000
3/1/2020 - 3/31/2020	2,608,668	29.05	2,599,388	\$ 924,514
Total	2,778,938	\$ 29.88	2,599,388	

- (1) Represents repurchases by Arch Capital of shares, from time to time, from employees in order to facilitate the payment of withholding taxes on restricted shares granted and the exercise of stock appreciation rights. We purchased these shares at their fair value, as determined by reference to the closing price of our common shares on the day the restricted shares vested or the stock appreciation rights were exercised.
- (2) Remaining amount available at March 31, 2020 under Arch Capital's share repurchase authorization, under which repurchases may be effected from time to time in open market or privately negotiated transactions. On November 8, 2019, the board of directors of AGL increased the aggregate purchase amount authorized under the share repurchase program to \$1.0 billion. Repurchases under this authorization may be effected from time to time in open market or privately negotiated transactions through December 31, 2021.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5. OTHER INFORMATION

In accordance with Section 10a(i)(2) of the Securities Exchange Act of 1934, as amended, we are responsible for disclosing non-audit services to be provided by our independent auditor, PricewaterhouseCoopers LLP, which are approved by the Audit Committee of our board of directors. During the 2020 first quarter, the Audit Committee approved engagements of PricewaterhouseCoopers LLP for permitted non-audit services, which consisted of tax consulting services, tax compliance services and other accounting consulting services.

Disclosure of Certain Activities Under Section 13(r) of the Securities Exchange Act of 1934

Section 13(r) of the Securities Exchange Act of 1934, as amended, requires an issuer to disclose in its annual or quarterly reports whether it or an affiliate knowingly engaged in certain activities described in that section, including certain activities related to Iran during the period covered by the report.

Certain of our non-U.S. subsidiaries underwrite insurance and facultative reinsurance on a global basis to non-U.S. insureds and insurers, including for liability, marine, aviation and energy risks. Coverage provided to non-Iranian business may indirectly cover an exposure in Iran. For example, certain of our operations underwrite global marine hull and cargo policies that provide coverage for vessels navigating into and out of ports worldwide, including Iran. For the quarter ended March 31, 2020, there has been no material amount of premium allocated or apportioned to activities relating to Iran, and we are unable to attribute gross revenues or net profits from any such policies because they insure multiple voyages and fleets containing multiple ships. Such non-U.S. subsidiaries will continue to provide such coverage only to the extent permitted by applicable law.

ITEM 6. EXHIBITS

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed Herewith
		Form	Original Number	Date Filed	
15	Accountants' Awareness Letter (regarding unaudited interim financial information)				X
31.1	Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002				X
31.2	Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002				X
32.1	Certification of Chief Executive Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002				X
32.2	Certification of Chief Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002				X
101.INS	XBRL Instance Document				
101.SCH	XBRL Taxonomy Extension Schema Document				
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document				
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document				
101.LAB	XBRL Taxonomy Extension Label Linkbase Document				
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document				

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

ARCH CAPITAL GROUP LTD.
(REGISTRANT)

Date: May 8, 2020

/s/ Marc Grandisson

Marc Grandisson
President and Chief Executive Officer (Principal Executive Officer)

Date: May 8, 2020

/s/ François Morin

François Morin
Executive Vice President, Chief Financial Officer and Treasurer (Principal Financial and Accounting Officer)

May 8, 2020

Securities and Exchange Commission
100 F Street, N.E.
Washington, DC 20549

Commissioners:

We are aware that our report dated May 8, 2020, on our review of interim financial information of Arch Capital Group Ltd., which appears in this Quarterly Report on Form 10-Q, is incorporated by reference in the Registration Statements on Form S-3 (Nos. 333-221344, 333-221344-01 and 333-221344-02) and in the Registration Statements on Form S-8 (Nos. 333-211193, 333-142835, 333-181308, 333-203993 and 333-224783) of Arch Capital Group Ltd.

Very truly yours,

/s/ PricewaterhouseCoopers LLP

New York, NY

1 of 1

Certification
of Chief Executive Officer
Pursuant to Section 302 of the
Sarbanes-Oxley Act of 2002

I, Marc Grandisson, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Arch Capital Group Ltd.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in the report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: May 8, 2020

By: /s/ Marc Grandisson

Name: Marc Grandisson

Title: President and Chief Executive Officer

Certification
of Chief Financial Officer
Pursuant to Section 302 of the
Sarbanes-Oxley Act of 2002

I, François Morin, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Arch Capital Group Ltd.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in the report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: May 8, 2020

By: /s/ François Morin

Name: François Morin

Title: Executive Vice President, Chief Financial Officer
and Treasurer

Certification Pursuant to Chapter 63, Title 18 United States Code §1350**As Adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002**

In connection with the Quarterly Report of Arch Capital Group Ltd. (the “Company”) on Form 10-Q for the period ending March 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), Marc Grandisson, as President and Chief Executive Officer of the Company, certifies pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) the Report fully complies with the requirements of section 13(a) of the Securities Exchange Act of 1934; and
- (2) the information contained in such report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 8, 2020

By: /s/ Marc Grandisson

Name: Marc Grandisson

Title: President and Chief Executive Officer

A signed original of this written statement required by Section 906 or other document authenticating, acknowledging or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to Arch Capital Group Ltd. and will be retained by Arch Capital Group Ltd. and furnished to the Securities and Exchange Commission or its staff upon request.

Certification Pursuant to Chapter 63, Title 18 United States Code §1350**As Adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002**

In connection with the Quarterly Report of Arch Capital Group Ltd. (the “Company”) on Form 10-Q for the period ending March 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), François Morin, as Executive Vice President, Chief Financial Officer and Treasurer of the Company, certifies pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) the Report fully complies with the requirements of section 13(a) of the Securities Exchange Act of 1934; and
- (2) the information contained in such report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 8, 2020

By: /s/ François Morin

Name: François Morin

Title: Executive Vice President, Chief Financial Officer and
Treasurer

A signed original of this written statement required by Section 906 or other document authenticating, acknowledging or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to Arch Capital Group Ltd. and will be retained by Arch Capital Group Ltd. and furnished to the Securities and Exchange Commission or its staff upon request.