UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

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

OR

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

For the Fiscal Year Ended December 31, 2019 **Commission File No. 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
Depositary shares, each representing a 1/1,000th interest in a 5.25% Series E preferred share	ACGLP	NASDAQ Stock Market
Depositary shares, each representing a 1/1,000th interest in a 5.45% Series F preferred share	ACGLO	NASDAQ Stock Market

Securities registered pursuant to Section 12(g) of the Exchange Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☑ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes ☐ No ☑

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act 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 if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☐

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 ☑

The aggregate market value of the voting and non-voting common equity held by non-affiliates, computed by reference to the closing price as reported by the NASDAQ Stock Market as of the last business day of the Registrant's most recently completed second fiscal quarter, was approximately $14.6 billion.

As of February 25, 2020, there were 406,658,701 of the registrant's common shares outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of Part III and Part IV incorporate by reference our definitive proxy statement for the 2020 annual meeting of shareholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A before May 1, 2020.

ARCH CAPITAL GROUP LTD.

TABLE OF CONTENTS

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, elsewhere in this report and in our periodic reports filed with the Securities and Exchange Commission (“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) 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;
- the effect of contagious diseases (including coronavirus) on our business;
- acts of terrorism, political unrest and other hostilities or other unforecasted and unpredictable events;
- 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 this Annual Report on Form 10-K, as well as the other factors set forth in Arch Capital Group Ltd.'s 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.

PART I

ITEM 1. BUSINESS

As used in this report, references to "we," "us," "our," "Arch" or the "Company" refer to the consolidated operations of Arch Capital Group Ltd. ("Arch Capital") and its subsidiaries. Tabular amounts are in U.S. Dollars in thousands, except share amounts, unless otherwise noted. We refer you to Item 1A "Risk Factors" for a discussion of risk factors relating to our business.

OUR COMPANY

General

Arch Capital, a Bermuda public limited liability company with $13.23 billion in capital at December 31, 2019, provides insurance, reinsurance and mortgage insurance on a worldwide basis through its wholly owned subsidiaries. While we are positioned to provide a full range of property, casualty and mortgage insurance and reinsurance lines, we focus on writing specialty lines of insurance and reinsurance. For 2019, we wrote $6.04 billion of net premiums and reported net income available to Arch common shareholders of $1.59 billion. Book value per share was $26.42 at December 31, 2019, compared to $21.52 per share at December 31, 2018.

Arch Capital's registered office is located at Clarendon House, 2 Church Street, Hamilton HM 11, Bermuda (telephone number: (441) 295-1422), and its principal executive offices are located at Waterloo House, Ground Floor, 100 Pitts Bay Road, Pembroke HM 08, Bermuda (telephone number: (441) 278-9250). Arch Capital makes available free of charge through its website, located at www.archcapgroup.com, its annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and all amendments to those reports as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. The SEC maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC (such as Arch Capital) and the address of that site is www.sec.gov.

Our History

Arch Capital was formed in September 2000 and became the sole shareholder of Arch Capital Group (U.S.) Inc. ("Arch-U.S.") pursuant to an internal reorganization transaction completed in November 2000. In October 2001, Arch Capital launched an underwriting initiative to meet current and future demand in the global insurance and reinsurance markets that included the recruitment of new management teams and an equity capital infusion of $763.2 million which created a strong capital base that was unencumbered by significant pre-2002 risks. Since then, we have attracted a proven management team with extensive industry experience and enhanced our existing global underwriting platform for our insurance, reinsurance and mortgage insurance and reinsurance businesses as described below.

Our insurance underwriting platform initially consisted of Arch Insurance (Bermuda), a division of Arch Reinsurance Ltd. ("Arch Re Bermuda"), our Bermuda-based reinsurer and insurer, and our U.S.-licensed insurers, Arch Insurance Company ("Arch Insurance"), Arch Excess & Surplus Insurance Company ("Arch E&S"), Arch Specialty Insurance Company ("Arch Specialty") and Arch Indemnity Insurance Company ("Arch Indemnity").

We established Arch Insurance (UK) Limited ("Arch Insurance (U.K.)"), our United Kingdom-based subsidiary, in 2004, and we expanded our North American presence when Arch Insurance opened a branch office in Canada in 2005. In 2013, Arch Insurance Canada Ltd. ("Arch Insurance Canada"), a Canada domestic company, commenced operations and replaced the branch office. In 2009, we established a managing agent and syndicate 2012 ("Arch Syndicate 2012") at Lloyd's of London ("Lloyd's") and in 2018, we acquired McNeil & Company, Inc. ("McNeil"), a U.S. nationwide leader in specialized risk management and program administration.

We expanded our insurance platform in 2019 through two acquisitions. In January 2019 we acquired a book of U.K. commercial lines business from Ardonagh Group and are writing this business through Arch Insurance (U.K.) ("Arch U.K. Regional Division"). In November 2019, we completed the acquisition of Barbican Group Holdings Limited ("Barbican Holdings"), a Guernsey company, and its subsidiaries, including Barbican Managing Agency Limited ("BMAL") and Lloyd's Syndicate 1955 ("Barbican Syndicate 1955"). BMAL also provides Managing Agency services to Third Party Capital Syndicate 1856 ("Arcus"). Barbican Holdings also includes Castel Underwriting Agencies Limited ("Castel") and other associated entities (collectively, "Barbican"). We also acquired U.K. commercial lines business from Ardonagh Group in January 2019, and this business is now written through Arch Insurance (U.K.) ("Arch U.K. Regional Division"). See "Operations—Insurance Operations" for further details on our insurance operations.

Our reinsurance underwriting platform initially consisted of Arch Re Bermuda and Arch Reinsurance Company ("Arch Re U.S."), our U.S.-licensed reinsurer. Our reinsurance operations in Europe began in 2006 with the formation of a Swiss branch of Arch Re Bermuda, and the formation of a Danish underwriting agency in 2007. In addition to the U.S. reinsurance treaty activities of Arch Re U.S., we launched our property facultative reinsurance underwriting operations in 2007, which underwrite in the U.S., Canada and Europe. In 2008, we formed Arch Reinsurance Europe Designated Activity Company ("Arch Re Europe"), our Ireland-based reinsurance company, which replaced the Swiss branch. We launched treaty operations in Canada in 2011 and the following year we acquired the credit and surety reinsurance operations of Ariel Reinsurance Company Ltd. The acquisition of Barbican in November 2019 also contributed to our reinsurance operations. See "Operations—Reinsurance Operations" for further details on our reinsurance operations.

Our mortgage operations include U.S. and international mortgage insurance and reinsurance operations as well as participation in government sponsored enterprise ("GSE") credit risk-sharing transactions. Formed in 2011, Arch Insurance (EU) Designated Activity Company (formerly, Arch Mortgage Insurance Designated Activity Company) ("Arch Insurance (EU)"), provides mortgage insurance products and services to the European market.

Our mortgage platform was built through the acquisition of CMG Mortgage Insurance Company in 2014 (subsequently renamed Arch Mortgage Insurance Company). We further expanded our U.S. operations in 2016 through the acquisition of United Guaranty Corporation ("UGC") (including United Guaranty Residential Insurance Company), from American International Group, Inc. ("AIG"). We acquired AIG United Guaranty Insurance (Asia) Limited (renamed "Arch MI Asia Limited") from AIG in 2017. In January 2019, Arch LMI Pty Ltd ("Arch LMI") was authorized by the Australian Prudential Regulation Authority ("APRA") to write lenders' mortgage insurance on a direct basis in Australia.

Our U.S. primary mortgage operations provide mortgage insurance products and services to the U.S. market. These operations include providers that are also approved as eligible mortgage insurers by Federal National Mortgage Association ("Fannie Mae") and Federal Home Loan Mortgage Corporation ("Freddie Mac"), each a GSE. The mortgage operations also include participation in GSE credit risk-sharing transactions and direct mortgage insurance to U.S. mortgage lenders with respect to mortgages that lenders intend to retain in portfolio or include in non-agency securitizations along with mortgage reinsurance on a global basis. See "Operations—Mortgage Operations" for further details on our mortgage operations.

It is our belief that our underwriting platform, our experienced management team and our strong capital base have enabled us to establish a strong presence in the markets we participate in.

In 2014 we acquired approximately 11% 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"). In 2017, we 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"). See "Operations—Other Operations" for further details on Watford and Premia.

The board of directors of Arch Capital (the "Board") has authorized the investment in Arch Capital's common shares through a share repurchase program. Repurchases under the share repurchase program may be effected from time to time in open market or privately negotiated transactions through December 31, 2021. Since the inception of the share repurchase program in February 2007 through December 31, 2019, Arch Capital has repurchased 386.3 million common shares for an aggregate purchase price of $3.97 billion. At December 31, 2019, the total remaining authorization under the share repurchase program was $1.00 billion.

OPERATIONS

We classify our businesses into three underwriting segments — insurance, reinsurance and mortgage — and two other operating segments — 'other' and corporate (non-underwriting). For an analysis of our underwriting results by segment, see note 4, "Segment Information," to our consolidated financial statements in Item 8 and "Management's Discussion and Analysis of Financial Condition and Results of Operations—Results of Operations."

Insurance Operations

Our insurance operations are conducted in Bermuda, the United States, Europe, Canada, and Australia. Our insurance operations in Bermuda are conducted through Arch Insurance (Bermuda), a division of Arch Re Bermuda, and Alternative Re Limited.

In the U.S., our insurance group's principal insurance subsidiaries are Arch Insurance, Arch Specialty, Arch Indemnity and Arch E&S. Arch Insurance is an admitted insurer in 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands and Guam. Arch Specialty is an approved excess and surplus lines insurer in 49 states, the District of Columbia, Puerto Rico and the U.S. Virgin Islands and an authorized insurer in one state. Arch Indemnity is an admitted insurer in 49 states and the District of Columbia. Arch E&S, which is not currently writing business, is an approved excess and surplus lines insurer in 47 states and the District of Columbia and an authorized insurer in one state. Our insurance group also operates McNeil, a specialized risk manager and a program administrator based in Cortland, New York. The headquarters for our insurance group's U.S. support operations (excluding underwriting units) are in Jersey City, New Jersey. The insurance group has offices throughout the U.S., including five regional offices located in Alpharetta, Georgia, Chicago, Illinois, New York, New York, San Francisco, California, Dallas, Texas and additional branch offices.

Our insurance operations in Canada are conducted through Arch Insurance Canada, a Canada domestic company which is authorized in all Canadian provinces and territories. Arch Insurance Canada is headquartered in Toronto, Ontario.

In 2019, Arch Insurance (EU), based in Dublin, Ireland, received authorization from the Central Bank of Ireland ("CBOI") to expand its classes of business as part of our plan to address the U.K.'s departure from the European Union ("Brexit"). As of January 2020, all of the insurance business in the European Union ("EU") previously written by Arch Insurance (U.K.) is now written through Arch Insurance (EU). Arch Insurance (EU) has branches in Denmark, Italy and the U.K. Following the acquisition of Barbican, we conduct insurance operations on several platforms, including Arch Insurance (U.K.), Arch Syndicate 2012 and Barbican Syndicate 1955. In addition, BMAL also provides managing agency services to Third Party Capital Syndicate 1856. Barbican also includes Castel Underwriting Agencies Limited ("Castel"). Collectively, the U.K. insurance operations are referred to as "Arch U.K.". Arch U.K. operations include the Arch U.K. Regional Division, which underwrites U.K. commercial lines. Arch U.K. conducts its operations from London, England, and other locations in the U.K. and also has branches in Germany, Italy, Spain and Denmark.

Arch Underwriting at Lloyd's Ltd ("AUAL") is the managing agent of Arch Syndicate 2012 and is responsible for the daily management of Arch Syndicate 2012. BMAL is the managing agent of Barbican Syndicate 1955 with daily management of Barbican Syndicate 1955 and Arcus Syndicate 1856. Arch Syndicate 2012 and Barbican Syndicate 1955 provide access to Lloyd's extensive distribution network and worldwide licenses. Arch Underwriting at Lloyd's (Australia) Pty Ltd, based in Sydney, Australia, is a Lloyd's services company which underwrites exclusively for Arch Syndicate 2012. Arch Underwriting Agency (Australia) Pty. Ltd. is an Australian agency which also underwrites for Arch Syndicate 2012 and third parties.

Strategy. Our insurance group's strategy is to operate in lines of business in which underwriting expertise can make a meaningful difference in operating results. The insurance group focuses on talent-intensive rather than labor-intensive business and seeks to operate profitably (on both a gross and net basis) across all of its product lines. To achieve these objectives, our insurance group's operating principles are to:

- *Capitalize on profitable underwriting opportunities*. Our insurance group believes that its experienced management and underwriting teams are positioned to locate and identify business with attractive risk/reward characteristics. As profitable underwriting opportunities are identified, our insurance group will continue to seek to make additions to its product portfolio in order to take advantage of market trends. This includes adding underwriting and other professionals with specific expertise in specialty lines of insurance.
- *Centralize responsibility for underwriting*. Our insurance group consists of a range of product lines. The underwriting executive in charge of each product line oversees all aspects of the underwriting product development process within such product line. Our insurance group believes that centralizing the control of such product line with the respective underwriting executive allows for close management of underwriting and creates clear accountability for results. Our U.S. insurance group has four regional offices, and the executive in charge of each region is primarily responsible for all aspects of the marketing and distribution of our insurance group's products, including the management of broker and other producer relationships in such executive's respective region. In our non-U.S. offices, a similar philosophy is observed, with responsibility for the management of each product line residing with the senior underwriting executive in charge of such product line.
- *Maintain a disciplined underwriting philosophy*. Our insurance group's underwriting philosophy is to generate an underwriting profit through prudent risk selection and proper pricing. Our insurance group believes that the key to this approach is adherence to uniform underwriting standards across all types of business. Our insurance group's senior management closely monitors the underwriting process.
- *Focus on providing superior claims management*. Our insurance group believes that claims handling is an integral component of credibility in the market for insurance products. Therefore, our insurance group believes that its ability to handle claims expeditiously and satisfactorily is a key to its success. Our insurance group employs experienced claims professionals and also utilizes experienced external claims managers (third party administrators) where appropriate.
- *Promote and utilize an efficient distribution system*. Our insurance group believes that promoting and utilizing a multi-channel distribution system, provides efficient access to its broad customer base. Our insurance group works with select international, national and regional retail and wholesale brokers and leading managing general agencies, including McNeil, to distribute our insurance

products. The Arch U.K. Regional Division expands our retail distribution network in the U.K.

- *Grow strategic partnerships in stable and niche areas.* Our insurance group aims to build more integrated long-term alignment with strategic partners offering superior access to niche opportunities, quality scalable businesses, or lines with reliable defensive qualities.

Our insurance group writes business on both an admitted and non-admitted basis. Our insurance group focuses on various specialty lines, as described in note 4, "Segment Information," to our consolidated financial statements in Item 8.

Underwriting Philosophy. Our insurance group's underwriting philosophy is to generate an underwriting profit (on both a gross and net basis) through prudent risk selection and proper pricing across all types of business. One key to this philosophy is the adherence to uniform underwriting standards across each product line that focuses on the following:

- risk selection;
- desired attachment point;
- limits and retention management;
- due diligence, including financial condition, claims history, management, and product, class and territorial exposure;
- underwriting authority and appropriate approvals; and
- collaborative decision making.

Marketing. Our insurance group's products are marketed principally through a group of licensed independent retail and wholesale brokers. Clients (insureds) are referred to our insurance group through a large number of international, national and regional brokers and captive managers who receive from the insured or insurer a set fee or brokerage commission usually equal to a percentage of gross premiums. In the past, our insurance group also entered into contingent commission arrangements with some brokers that provided for the payment of additional commissions based on volume or profitability of business. Currently, some of our contracts with brokers provide for additional commissions based on volume. We have also entered into service agreements with select international brokers that provide access to their proprietary industry analytics. In general, our insurance group has no implied or explicit commitments to accept business from any particular broker and neither brokers nor any other third parties have the authority to bind our insurance group, except in the case where underwriting authority may be delegated contractually to select program administrators. Such administrators are subject to a due diligence financial and operational review prior to any such delegation of authority and ongoing reviews and audits are carried out as deemed necessary by our insurance group to assure the continuing integrity of underwriting and related business operations. See "Risk Factors—Risks Relating to Our Company—We could be materially adversely affected to the extent that managing general agents, general agents and other producers exceed their underwriting authorities or if our agents, our insureds or other third parties commit fraud or otherwise breach obligations owed to us." For information on major brokers, see note 17, "Commitments and Contingencies—Concentrations of Credit Risk," to our consolidated financial statements in Item 8.

Risk Management and Reinsurance. In the normal course of business, our insurance group may cede a portion of its premium on a quota share or excess of loss basis through treaty or facultative reinsurance agreements. Reinsurance arrangements do not relieve our insurance group from its primary obligations to insureds. Reinsurance recoverables are recorded as assets, predicated on the reinsurers' ability to meet their obligations under the reinsurance agreements. If the reinsurers are unable to satisfy their obligations under the agreements, our insurance subsidiaries would be liable for such defaulted amounts. Our principal insurance subsidiaries, with oversight by a group-wide reinsurance steering committee ("RSC"), are selective with regard to reinsurers, seeking to place reinsurance with only those reinsurers which meet and maintain specific standards of established criteria for financial strength. The RSC evaluates the financial viability of its reinsurers through financial analysis, research and review of rating agencies' reports and also monitors reinsurance recoverables and collateral with unauthorized reinsurers. The financial analysis includes ongoing qualitative and quantitative assessments of reinsurers, including a review of the financial stability, appropriate licensing, reputation, claims paying ability and underwriting philosophy of each reinsurer. Our insurance group will continue to evaluate its reinsurance requirements. See note 7, "Reinsurance," to our consolidated financial statements in Item 8.

For catastrophe-exposed insurance business, our insurance group seeks to limit the amount of exposure to catastrophic losses it assumes through a combination of managing aggregate limits, underwriting guidelines and reinsurance. For a discussion of our risk management policies, see "Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies, Estimates and Recent Accounting Pronouncements—Ceded Reinsurance" and "Risk Factors—Risks Relating to Our Industry—The failure of any of the loss limitation methods we employ could have a material adverse effect on our financial condition or results of operations."

Claims Management. Our insurance group's claims management function is performed by claims professionals, as well as experienced external claims managers (third party administrators), where appropriate. In addition to investigating, evaluating and resolving claims, members of our insurance group's claims departments work with underwriting professionals as functional teams in order to develop products and services desired by the group's clients.

Reinsurance Operations

Our reinsurance operations are conducted on a worldwide basis through our reinsurance subsidiaries, Arch Re Bermuda, Arch Re U.S. and Arch Re Europe. Arch Re Bermuda is a registered Class 4 insurer and long-term insurer and is headquartered in Hamilton, Bermuda. Arch Re U.S. is licensed or is an accredited or otherwise approved reinsurer in 50 states, the District of Columbia and Puerto Rico, the provinces of Ontario and Quebec in Canada with its principal U.S. offices in Morristown, New Jersey. Treaty operations in Canada are conducted through the Canadian branch of Arch Re U.S. ("Arch Re Canada"). Arch Re U.S. is also an admitted insurer in Guam. Our property facultative reinsurance operations are conducted primarily through Arch Re U.S. The property facultative reinsurance operations have offices throughout the U.S., Canada and in Europe. Arch Re Europe, licensed and authorized as a non-life reinsurer and a life reinsurer, is headquartered in Dublin, Ireland with branch offices in Zurich and London.

Strategy. Our reinsurance group's strategy is to capitalize on our financial capacity, experienced management and operational flexibility to offer multiple products through our operations. The reinsurance group's operating principles are to:

- *Actively select and manage risks*. Our reinsurance group only underwrites business that meets certain profitability criteria, and it emphasizes disciplined underwriting over premium growth. To this end, our reinsurance group maintains centralized control over reinsurance underwriting guidelines and authorities.
- *Maintain flexibility and respond to changing market conditions*. Our reinsurance group's organizational structure and philosophy allows it to take advantage of increases or changes in demand or favorable pricing trends. Our reinsurance group believes that its existing platforms in Bermuda, the U.S., Europe and Canada, broad underwriting expertise and substantial capital facilitate adjustments to its mix of business geographically and by line and type of coverage. Our reinsurance group believes that this flexibility allows it to participate in those market opportunities that provide the greatest potential for underwriting profitability.
- *Maintain a low cost structure*. Our reinsurance group believes that maintaining tight control over its staffing level and operating primarily as a broker market reinsurer permits it to maintain low operating costs relative to its capital and premiums.

Our reinsurance group writes business on both a proportional and non-proportional basis and writes both treaty and facultative business. In a proportional reinsurance arrangement (also known as pro rata reinsurance, quota share reinsurance or participating reinsurance), the reinsurer shares a proportional part of the original premiums and losses of the reinsured. The reinsurer pays the cedent a commission which is generally based on the cedent's cost of acquiring the business being reinsured (including commissions, premium taxes, assessments and miscellaneous administrative expenses) and may also include a profit factor. Non-proportional (or excess of loss) reinsurance indemnifies the reinsured against all or a specified portion of losses on underlying insurance policies in excess of a specified amount, which is called a "retention." Non-proportional business is written in layers and a reinsurer or group of reinsurers accepts a band of coverage up to a specified amount. The total coverage purchased by the cedent is referred to as a "program." Any liability exceeding the upper limit of the program reverts to the cedent.

The reinsurance group's treaty operations generally seek to write significant lines on less commoditized classes of coverage, such as specialty property and casualty reinsurance treaties. However, with respect to other classes of coverage, such as property catastrophe and casualty clash, the reinsurance group's treaty operations participate in a relatively large number of treaties where they believe that they can underwrite and process the business efficiently. The reinsurance group's property facultative operations write reinsurance on a facultative basis whereby they assume part of the risk under primarily single insurance contracts. Facultative reinsurance is typically purchased by ceding companies for individual risks not covered by their reinsurance treaties, for unusual risks or for amounts in excess of the limits on their reinsurance treaties.

Our reinsurance group focuses on various specialty lines, as described in note 4, "Segment Information," to our consolidated financial statements in Item 8.

Underwriting Philosophy. Our reinsurance group employs a disciplined, analytical approach to underwriting reinsurance risks that is designed to specify an adequate premium for a given exposure commensurate with the amount of capital it anticipates placing at risk. A number of our reinsurance group's underwriters are also actuaries. It is our reinsurance group's belief that employing actuaries on the front-end of the underwriting process gives it an advantage in evaluating risks and constructing a high quality book of business.

As part of the underwriting process, our reinsurance group typically assesses a variety of factors, including:

- adequacy of underlying rates for a specific class of business and territory;
- the reputation of the proposed cedent and the likelihood of establishing a long-term relationship with the cedent, the geographic area in which the cedent does business, together with its catastrophe exposures, and our aggregate exposures in that area;

- historical loss data for the cedent and, where available, for the industry as a whole in the relevant regions, in order to compare the cedent's historical loss experience to industry averages;
- projections of future loss frequency and severity; and
- the perceived financial strength of the cedent.

Marketing. Our reinsurance group generally markets its reinsurance products through brokers, except our property facultative reinsurance group, which generally deals directly with the ceding companies. Brokers do not have the authority to bind our reinsurance group with respect to reinsurance agreements, nor does our reinsurance group commit in advance to accept any portion of the business that brokers submit to them. Our reinsurance group generally pays brokerage fees to brokers based on negotiated percentages of the premiums written through such brokers. For information on major brokers, see note 17, "Commitments and Contingencies—Concentrations of Credit Risk," to our consolidated financial statements in Item 8.

Risk Management and Retrocession. Our reinsurance group currently purchases a combination of per event excess of loss, per risk excess of loss, proportional retrocessional agreements and other structures that are available in the market. Such arrangements reduce the effect of individual or aggregate losses on, and in certain cases may also increase the underwriting capacity of, our reinsurance group. Our reinsurance group will continue to evaluate its retrocessional requirements based on its net appetite for risk. See note 7, "Reinsurance," to our consolidated financial statements in Item 8.

For catastrophe exposed reinsurance business, our reinsurance group seeks to limit the amount of exposure it assumes from any one reinsured and the amount of the aggregate exposure to catastrophe losses from a single event in any one geographic zone. For a discussion of our risk management policies, see "Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies, Estimates and Recent Accounting Pronouncements—Ceded Reinsurance" and "Risk Factors—Risks Relating to Our Industry—The failure of any of the loss limitation methods we employ could have a material adverse effect on our financial condition or results of operations."

Claims Management. Claims management includes the receipt of initial loss reports, creation of claim files, determination of whether further investigation is required, establishment and adjustment of case reserves and payment of claims. Additionally, audits are conducted for both specific claims and overall claims procedures at the offices of selected ceding companies. Our reinsurance group makes use of outside consultants for claims work from time to time.

Mortgage Operations

Our mortgage operations provide 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 primarily through Arch Re Bermuda to mortgage insurers on both a proportional and non-proportional basis globally; direct mortgage insurance in Europe through Arch Insurance (EU) 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.

In 2014 we completed the acquisition of CMG Mortgage Insurance Company from its owners, PMI Mortgage Insurance Co., ("PMI") and CMFG Life Insurance Company ("CUNA Mutual") and acquired PMI's mortgage insurance platform and related assets. CMG Mortgage Insurance Company was renamed "Arch Mortgage Insurance Company" and entered the U.S. mortgage insurance marketplace. Arch Mortgage Insurance Company is licensed and operates in all 50 states, the District of Columbia and Puerto Rico. In December 2016, we completed the acquisition of UGC and its primary operating subsidiary, United Guaranty Residential Insurance Company, which is licensed and operates in all 50 states and the District of Columbia.

Arch Mortgage Insurance Company and United Guaranty Residential Insurance Company have each been approved as an eligible mortgage insurer by Fannie Mae and Freddie Mac, subject to maintaining certain ongoing requirements ("eligible mortgage insurer"). Arch Mortgage Guaranty Company offers direct mortgage insurance to U.S. mortgage lenders with respect to mortgages that lenders intend to retain in portfolio or include in non-agency securitizations. Arch Mortgage Guaranty Company, which is licensed in all 50 states and the District of Columbia, insures mortgages that are not intended to be sold to the GSEs, and it is therefore not approved by either GSE as an eligible mortgage insurer.

Arch Insurance (EU) was licensed and authorized by the CBOI in 2011 to operate on a pan-European basis under the EU's freedom of establishment/freedom of services rules. Arch Underwriters Europe Limited ("Arch Underwriters Europe"), an Irish company authorized as an insurance and reinsurance intermediary by the CBOI, acts on behalf of Arch Insurance (EU) and Arch Re Europe with branch offices in Italy, Switzerland, the U.K., and Finland. In 2017 we completed the acquisition of Arch MI Asia from AIG. In January 2019, Arch LMI was authorized by APRA to write lenders' mortgage insurance. Arch LMI is headquartered in Sydney, Australia and focuses on providing direct lenders' mortgage insurance to the Australian market.

Strategy. The mortgage insurance market operates on a distinct underwriting cycle, with demand driven mainly by the housing market and general economic conditions. As a result, the creation of the mortgage group provides us with a more diverse revenue stream. Our mortgage group's strategy is to capitalize on its financial capacity, mortgage insurance technology platform, operational flexibility and experienced management to offer mortgage insurance, reinsurance and other risk-sharing products in the U.S. and around the world.

Our mortgage group's operating principles and goals are to:

- *Capitalize on profitable underwriting opportunities*. Our mortgage group believes that its experienced management, analytics and underwriting teams are positioned to identify and evaluate business with attractive risk/reward characteristics.

- *Maintain a disciplined credit risk philosophy*. Our mortgage group's credit risk philosophy is to generate underwriting profit through disciplined credit risk analysis and proper pricing. Our mortgage group believes that the key to this approach is maintaining discipline across all phases of the applicable housing and mortgage lending cycles.

- *Provide superior and innovative mortgage products and services*. Our mortgage group believes that it can leverage its financial capacity, experience across insurance product lines, and its analytics and technology to provide innovative products and superior service. The mortgage group believes that its delivery of tailored products that meet the specific, evolving needs of its customers will be a key to the group's success.

- *Maintain our position as a leading provider of U.S. mortgage insurance business*. Prior to our 2014 acquisition, Arch Mortgage Insurance Company was the leading provider of mortgage insurance products and services to credit unions in the U.S. We broadened our customer base into national and regional banks and mortgage originators while maintaining and increasing our share of the mortgage insurance credit union market. With the acquisition of UGC in 2016, a leading provider of mortgage insurance products and services to national and regional banks and mortgage originators, we became a leading provider of U.S. mortgage insurance.

Our mortgage group focuses on the following areas:

- *Direct mortgage insurance in the United States*. Under their monoline insurance licenses, each of Arch's eligible mortgage insurers may only offer private mortgage insurance covering first lien, one-to-four family residential mortgages. Nearly all of our mortgage insurance written provides first loss protection on loans originated by mortgage lenders and sold to the GSEs. Each GSE's Congressional charter generally prohibits it from purchasing a mortgage where the principal balance of the mortgage is in excess of 80% of the value of the property securing the mortgage unless the excess portion of the mortgage is protected against default by lender recourse, participation or by a qualified insurer. As a result, such "high loan-to-value mortgages" purchased by Fannie Mae or Freddie Mac generally are insured with private mortgage insurance.

  Mortgage insurance protects the insured lender, investor or GSE against loss in the event of a borrower's default. If a borrower defaults on mortgage payments, private mortgage insurance reduces, and may eliminate, losses to the insured. Private mortgage insurance may also facilitate the sale of mortgage loans in the secondary mortgage market because of the credit enhancement it provides. Our primary U.S. mortgage insurance policies predominantly cover individual loans and are effective at the time the loan is originated. We also may enter into insurance transactions with lenders and investors, under which we insure a portfolio of loans at or after origination. Although not currently a significant product, we may offer mortgage insurance on a "pool" basis in the future. Under pool insurance, the mortgage insurer provides coverage on a group of specified loans, typically for 100% of all contractual or policy-defined losses on every loan in the portfolio, subject to an agreed aggregate loss limit. Pool insurance may be in a first loss position with respect to loans that do not have primary mortgage insurance policies, or it may be in a second loss position, covering losses in excess of those covered by the primary mortgage insurance policy.

- *Direct mortgage insurance in Europe and other countries where we identify profitable underwriting opportunities*. Since 2011, Arch Insurance (EU) has offered mortgage insurance to European mortgage lenders. Arch Insurance (EU)'s mortgage insurance is primarily purchased by European mortgage lenders in order to reduce lenders' credit risk and regulatory capital requirements associated with the insured mortgages. In certain European countries, lenders purchase mortgage insurance to facilitate regulatory compliance with respect to high loan-to-value residential lending. Arch Insurance (EU) offers mortgage insurance on both a "flow" basis to cover new originations and through structured transactions to cover one or more portfolios of previously originated residential loans. Following regulatory approval of Arch LMI in January 2019, we are also focused on expanding origination opportunities for lenders in Australia.

- *Reinsurance*. Arch Re Bermuda provides quota share reinsurance covering U.S. and international mortgages. Such amounts include a quota share reinsurance agreement with PMI pursuant to which it agreed to provide 100% quota share indemnity reinsurance to PMI for all certificates of insurance that were issued by PMI from January 1, 2009 through December 31, 2011 that were not in default as of an agreed upon effective date. Other than this quota share, no PMI legacy mortgage insurance exposures were assumed.

- *Other credit risk-sharing products*. In addition to providing traditional mortgage insurance and reinsurance, we offer various credit risk-sharing products to government agencies and mortgage lenders. The GSEs have reduced their exposure to mortgage risk and continue to shift more of it to the private sector, creating opportunities for insurers to assume additional mortgage risk. In 2013, Arch Re Bermuda became the first (re)insurance company to participate in Freddie Mac's program to transfer certain credit risk in its single-family portfolio to the private sector. Since that time, Arch Re Bermuda and its affiliates have regularly participated in both Fannie Mae and Freddie Mac risk sharing programs.

In 2015 we established Arch Mortgage Risk Transfer PCC Inc. ("Arch MRT") a District of Columbia based protected cell captive insurer, licensed by District of Columbia Department of Insurance, Securities and Banking as a mortgage insurer. Arch MRT issues direct mortgage insurance to the GSEs through incorporated protected cells and cedes 100% of the risk to GSE approved reinsurers, including Arch Re U.S. Arch MRT entered into pilot transactions with both GSEs in 2018 and amended and extended both policies in 2019.

In 2019 we established Arch Credit Risk Services (Bermuda) ("ACRS") Ltd. ACRS is licensed by the Bermuda Monetary Authority ("BMA") as an insurance agent in Bermuda. ACRS offers mortgage credit assessment and underwriting advisory services with respect to participation in GSE credit risk transfer transactions.

Underwriting Philosophy. Our mortgage group believes in a disciplined, analytical approach to underwriting mortgage risks by utilizing proprietary and third party models, including forecasting delinquency and future home price movements with the goal of ensuring that premiums are adequate for the risk being insured. Experienced actuaries and statistical modelers are engaged in analytics to inform the underwriting process. As part of the underwriting process, our mortgage group typically assesses a variety of factors, including the:

- ability and willingness of the mortgage borrower to pay its obligations under the mortgage loan being insured;
- characteristics of the mortgage loan being insured and the value of the collateral securing the mortgage loan;
- financial strength, quality of operations and reputation of the lender originating the mortgage loan;
- expected future home price movements which vary by geography;
- projections of future loss frequency and severity; and
- adequacy of premium rates.

Sales and Distribution. We employ a sales force located throughout the U.S. to directly sell mortgage insurance products and services to our customers, which include mortgage originators such as mortgage bankers, mortgage brokers, commercial banks, savings institutions, credit unions and community banks. Our largest single mortgage insurance customer (including branches and affiliates) accounted for 4.0% and 4.7% of our gross premiums written for the years ending December 31, 2019 and 2018, respectively. No other customer accounted for greater than 3.3% and 2.7% of the gross premiums written for the years ending December 31, 2019 and 2018, respectively. The percentage of gross premiums written on our top 10 customers was 20.8% and 20.9% as of December 31, 2019 and 2018, respectively. In Europe, Asia, Bermuda and Australia, our products and services are/or will be distributed on a direct basis and through brokers. Each country represents a unique set of opportunities and challenges that require knowledge of market conditions and client needs to develop effective solutions.

Risk Management. Exposure to mortgage risk is monitored globally and managed through underwriting guidelines, pricing, reinsurance, utilization of proprietary risk models, concentration limits and limits on net probable loss resulting from a severe economic downturn in the housing market. For a discussion of our risk management policies, see "Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies, Estimates and Recent Accounting Pronouncements—Ceded Reinsurance" and "Risk Factors—Risks Relating to Our Industry—The failure of any of the loss limitation methods we employ could have a material adverse effect on our financial condition or results of operations."

Our mortgage group has ceded a portion of its premium on a quota share basis through certain reinsurance agreements and through aggregate excess of loss reinsurance agreements which provide reinsurance coverage for delinquencies on portfolios of in-force policies issued between certain periods. See note 7, "Reinsurance," to our consolidated financial statements in Item 8 for further details.

Reinsurance arrangements do not relieve our mortgage group from its primary obligations to insured parties. Reinsurance recoverables are recorded as assets, predicated on the reinsurers' ability to meet their obligations under the reinsurance agreements. If the reinsurers are unable to satisfy their obligations under the agreements, our mortgage subsidiaries would be liable for such defaulted amounts. For our U.S. mortgage insurance business, in addition to utilizing reinsurance, we have developed a proprietary risk model that simulates the maximum loss resulting from severe economic events impacting the housing market. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Catastrophic Events and Severe Economic Events."

Claims Management. With respect to our direct mortgage insurance business, the claims process generally begins with notification by the insured or servicer to us of a default on an insured loan. The insured is generally required to notify us of a default after the borrower misses two consecutive monthly payments. Borrowers default for a variety of reasons, including a reduction of income, unemployment, divorce, illness, inability to manage credit, rising interest rate levels and declining home prices. Upon notice of a default, in certain cases we may coordinate with loan servicers to facilitate and enhance retention workouts on insured loans. Retention workouts include loan modifications and other loan repayment options, which may enable borrowers to cure mortgage defaults and retain ownership of their homes. If a retention workout is not viable for a borrower, our loss on a loan may be mitigated through a liquidation workout option, including a pre-foreclosure sale or a deed-in-lieu of foreclosure.

In the U.S., our master policies generally provide that within 60 days of the perfection of a primary insurance claim, we have the option of:

- paying the insurance coverage percentage specified in the certificate of insurance multiplied by the loss amount;
- in the event the property is sold pursuant to an approved prearranged sale, paying the lesser of (i) 100% of the loss amount less the proceeds of sale of the property, or (ii) the specified coverage percentage multiplied by the loss amount; or
- paying 100% of the loss amount in exchange for the insured's conveyance to us of good and marketable title to the property, with us then selling the property for our own account.

While we select the claim settlement option that best mitigates the amount of our claim payment, in the U.S. we generally pay the coverage percentage multiplied by the loss amount.

Other Operations

In 2014 we and HPS Investment Partners, LLC (formerly Highbridge Principal Strategies, LLC) ("HPS"), sponsored the formation of Watford. Arch Re Bermuda invested $100.0 million in Watford common shares and acquired approximately 11% of Watford as well as warrants to purchase up to 975,503 additional common shares. We also purchased $35.0 million in aggregate principal amount of Watford Holdings Ltd's 6.5% senior notes in 2019. Watford's strategy is to combine a diversified reinsurance and insurance business with a disciplined investment strategy comprised primarily of non-investment grade credit assets. Watford's own management and board of directors are responsible for its results and profitability. Arch Re Bermuda has appointed two directors to serve on the eight person board of directors of Watford. See note 11, "Variable Interest Entity and Noncontrolling Interests," to our consolidated financial statements in Item 8 for further details.

In 2017 we and Kelso & Company ("Kelso") sponsored the formation of 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 Re Bermuda is providing a 25% quota share reinsurance treaty on certain business written by Premia, and subsidiaries of Arch Capital are providing certain administrative and support services to Premia, in each case pursuant to separate multi-year agreements. Arch Re Bermuda has appointed two directors to serve on the seven person board of directors of Premia. In the 2019 fourth quarter, Barbican 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. See note 15, "Transactions with Related Parties," to our consolidated financial statements in Item 8 for further details.

Employees

As of February 21, 2020, Arch Capital and its subsidiaries employed approximately 4,300 full-time employees.

RESERVES

Reserves for losses and loss adjustment expenses ("Loss Reserves") represent estimates of what the insurer or reinsurer ultimately expects to pay on claims at a given time, based on facts and circumstances then known, and it is probable that the ultimate liability may exceed or be less than such estimates. Even actuarially sound methods can lead to subsequent adjustments to reserves that are both significant and irregular due to the nature of the risks written. Loss Reserves are inherently subject to uncertainty.

For detail on our Loss Reserves by segment and potential variability in the reserving process, see the Loss Reserves section of "Critical Accounting Policies, Estimates and Recent Accounting Pronouncements" in Item 7. For an analysis of losses and loss adjustment expenses and a reconciliation of the beginning and ending Loss Reserves and information about prior year reserve development, see note 5, "Reserve for Losses and Loss Adjustment Expenses," to our consolidated financial statements in Item 8. For information on our reserving process, see note 6, "Short Duration Contracts," to our consolidated financial statements in Item 8.

Unpaid and paid losses and loss adjustment expenses recoverable were approximately $4.35 billion at December 31, 2019. For detail on our unpaid and paid losses and loss adjustment expenses, see the Reinsurance Recoverables section of "Financial Condition, Reinsurance Recoverables" in Item 7.

INVESTMENTS

At December 31, 2019, total investable assets held by Arch were $22.3 billion, excluding the $2.70 billion included in the 'other' segment (*i.e.*, attributable to Watford). Our current investment guidelines and approach stress preservation of capital, market liquidity and diversification of risk. Our investments are subject to market-wide risks and fluctuations, as well as to risks inherent in particular securities. While maintaining our emphasis on preservation of capital and liquidity, we expect our portfolio to become more diversified and, as a result, we may in the future expand into areas which are not part of our current investment strategy. For detail on our investments, see the Investable Assets Held by Arch section of "Financial Condition" in Item 7 and note 8, "Investment Information," to our consolidated financial statements in Item 8.

RATINGS

Our ability to underwrite business is affected by the quality of our claims paying ability and financial strength ratings as evaluated by independent agencies. Such ratings from third party internationally recognized statistical rating organizations or agencies are instrumental in establishing the financial security of companies in our industry. We believe that the primary users of such ratings include commercial and investment banks, policyholders, brokers, ceding companies and investors. Insurance ratings are also used by insurance and reinsurance intermediaries as an important means of assessing the financial strength and quality of insurers and reinsurers, and are often an important factor in the decision by an insured or intermediary of whether to place business with a particular insurance or reinsurance provider.

The financial strength ratings of our operating insurance and reinsurance subsidiaries are subject to periodic review as rating agencies evaluate us to confirm that we continue to meet their criteria for ratings assigned to us by them. Such ratings may be revised downward or revoked at the sole discretion of such ratings agencies in response to a variety of factors, including capital adequacy, management, earnings, forms of capitalization and risk profile. Periodically, rating agencies evaluate us to confirm that we continue to meet their criteria for the ratings assigned to us by them. A.M. Best Company ("A.M. Best"), Fitch Ratings ("Fitch"), Moody's Investors Service ("Moody's") and Standard & Poor's ("S&P") are ratings agencies which have assigned financial strength and/or issuer ratings to Arch Capital and/or one or more of its subsidiaries.

The ratings issued on our companies by these agencies are announced publicly and are available directly from the agencies. Our Internet site (*www.ir.archcapgroup.com*, under Credit Ratings) contains information about our ratings, but such information on our website is not incorporated by reference into this report.

COMPETITION

The worldwide reinsurance and insurance businesses are highly competitive. We compete, and will continue to compete, with major U.S. and non-U.S. insurers and reinsurers, some of which have greater financial, marketing and management resources than we have and longer-term relationships with insureds and brokers than we have had. We compete with other insurers and reinsurers primarily on the basis of overall financial strength, ratings assigned by independent rating agencies, geographic scope of business, strength of client relationships, premiums charged, contract terms and conditions, products and services offered, speed of claims payment, reputation, employee experience, and qualifications and local presence.

In our insurance business, we compete with insurers that provide specialty property and casualty lines of insurance, including Alleghany Corporation, American Financial Group, Inc., American International Group, Inc., AXA XL, AXIS Capital Holdings Limited, Berkshire Hathaway, Inc., Chubb Limited, CNA Financial Corp., Everest National Insurance Company, Fairfax Financial Holdings Limited, The Hartford Financial Services Group, Inc., Liberty Mutual Insurance, Lloyd's, Markel Insurance Company, RLI Corp., Sompo International, Tokio Marine HCC, The Travelers Companies, Inc., W.R. Berkley Corp. and Zurich Insurance Group.

In our reinsurance business, we compete with reinsurers that provide property and casualty lines of reinsurance, including Alleghany Corporation, American International Group, Argo International Holdings, Ltd., AXA XL, AXIS Capital Holdings Limited, Berkshire Hathaway, Inc., Chubb Limited, Everest Re Group Ltd., Hannover Rück SE, Lloyd's, Markel Global Reinsurance, Munich Re Group, PartnerRe Ltd., RenaissanceRe Holdings Ltd., SCOR Global P&C, SCOR Global Life, Sompo International and Swiss Reinsurance Company.

In our U.S. mortgage business, we compete with five active U.S. mortgage insurers, which include the mortgage insurance subsidiaries of Essent Group Ltd., Genworth Financial Inc., MGIC Investment Corporation, NMI Holdings Inc. and Radian Group Inc. The private mortgage insurance industry is highly competitive. Private mortgage insurers generally compete on the basis of underwriting guidelines, pricing, terms and conditions, financial strength, product and service offerings, customer relationships, reputation, the strength of management, technology, and innovation in the delivery and servicing of insurance products. Arch MI U.S. and other private mortgage insurers compete with federal and state government agencies that sponsor their own mortgage insurance programs. The private mortgage insurers' principal government competitor is the Federal Housing Administration ("FHA") and, to a lesser degree, the U.S. Department of Veterans Affairs ("VA"). Future changes to the FHA program may impact the demand for private mortgage insurance.

Arch MI U.S. and other private mortgage insurers increasingly compete with multi-line reinsurers and capital markets alternatives to private mortgage insurance. The GSEs continued their respective mortgage credit risk transfer ("CRT") programs including the use of front and back-end transactions with multiline reinsurers. These transactions continue to create opportunities for multiline property casualty reinsurance groups and capital markets participants. The ongoing expansion of the GSEs risk transfer programs continue to attract additional reinsurers into the market with approximately 40 reinsurers now competing for business.

For other U.S. risk sharing products and non-U.S. mortgage insurance opportunities, we have also seen increased competition from well capitalized and highly rated multiline reinsurers. It is our expectation that the depth and capacity of competitors from this segment will continue to increase over the next several years as more residential mortgage credit risk is borne by private capital.

ENTERPRISE RISK MANAGEMENT

General. Enterprise Risk Management ("ERM") is a key element in our philosophy, strategy and culture. We employ an ERM framework that includes underwriting, reserving, investment, credit and operational risks. Risk appetite and exposure limits are set by our executive management team, reviewed with the Board and its committees and routinely discussed with business unit management. These limits are articulated in our risk appetite statement, which details risk appetite, tolerances and limits for each major risk category, and are integrated into our operating guidelines. Exposures are aggregated and monitored periodically by our corporate risk management team. The reporting, review and approval of risk management information is integrated into our annual planning process, capital modeling and allocation, reinsurance purchasing strategy and reviewed at insurance business reviews, reinsurance underwriting meetings and board level committees.

Risk Management Process and Procedures. The following narrative provides an overview of our risk management framework and our methodology for identifying, measuring, managing and reporting on the key risks affecting us. It outlines our approach to risk identification and assessment and provides an overview of our risk appetite and tolerance for each of the following major risks: underwriting (insurance) risk including pricing, reserving and catastrophe; investment including market and liquidity risks; strategic risk; group risk including governance and capital market risk; credit risk; and operational risk, including regulatory, investor relations (reputational risk), rating agency and outsourcing risks.

The framework includes details of our risk philosophy and policies to address the material risks confronting us; and compliance, approach and procedures to control and or mitigate these risks. The actions and policies implemented to meet our business management and regulatory obligations form the core of this framework. We have adopted a holistic approach to risk management by analyzing risk from both a top-down and bottom-up perspective.

Risk Identification and Assessment. The Finance, Investment and Risk Committee ("FIR Committee"), Audit Committee and Underwriting Oversight Committee of the Board oversee the top-down and bottom-up review of our risks. Given the nature and scale of our operations, these committees consider all aforementioned risks within the scope of the assessment. Arch Capital's Chief Risk Officer ("CRO") assists these committees in the identification and assessment of all key risks. The CRO is responsible for maintaining Arch Capital's risk register and continually reviewing and challenging risk assessments, including the impact of emerging risks and significant business developments. Board approval is required for any new high level risks or change in inherent or residual designations.

Risk Monitoring and Control. Arch Capital's risk management framework requires risk owners to monitor key risks on a continuous basis. The highest residual risks are actively managed by the FIR Committee. The remaining risks are managed and monitored at a process level by the risk owners and/or the CRO. Risk owners have ultimate responsibility for the day-to-day management of each designated risk, reporting to the CRO on the satisfactory management and control of the risk and timely escalation of significant issues that may arise in relation to that risk. The CRO is responsible for overseeing the monitoring of all risks across the business and for communicating to the relevant risk owners if she becomes aware of issues, or potential and actual breaches of risk appetite, relevant to the assigned risks. A key element of these monitoring activities is the evaluation of our position relative to risk tolerances and limits approved by the Board.

Risk Reporting. Quarterly, the CRO compiles the results of the key risk review process into a report to the FIR Committee for review and discussion at their quarterly meeting. The report includes an overview of selected key risks; a risk dashboard that depicts the status of risk limit and tolerance metrics; changes in the rating of high level risks in the Arch Capital risk register; and summaries of our largest exposures and reinsurance recoverables. If necessary, risk management matters reviewed at the FIR Committee meeting are presented for discussion by the Board. The CRO is responsible for immediately escalating any significant risk matters to executive management, the FIR Committee and/or the Board for approval of the required remediation. As part of our corporate governance, the Board and certain of its committees hold regular executive sessions with members of our management team. These sessions are intended to ensure an open and frank dialogue exists about various forms of risk across the organization.

Implementation and Integration. We believe that an integrated approach to developing, measuring and reporting our Own Risk and Solvency Assessment ("ORSA") is an integral part of the risk management framework. The ORSA process provides the link between Arch Capital's risk profile, its board-approved risk appetite including approved risk tolerances and limits, its business strategy and its overall solvency requirements. The ORSA is the entirety of the processes and procedures employed to identify, assess, monitor, manage, and report the short- and long-term risks we face or may face and to determine the capital necessary to ensure that our overall solvency needs are met at all times. The ORSA also makes the link between actual reported results and the capital assessment.

The ORSA is the basis for risk reporting to the Board and its committees and acts as a mechanism to embed the risk management framework within our decision making processes and operations. The Board has delegated responsibility for supervision and oversight of the ORSA to the FIR Committee. This oversight includes regular reviews of the ORSA process and output. An ORSA report is produced at least annually and the results of each assessment are reported to the Board. The Board actively participates in the ORSA process by steering how the assessment is performed and challenging its results. This assessment is also taken into account when formulating strategic decisions.

The ORSA process and reporting are integral parts of our business strategy, tailored specifically to fit into our organizational structure and risk management system with the appropriate techniques in place to assess our overall solvency needs, taking into consideration the nature, scale and complexity of the risks inherent in the business.

We also take the results of the ORSA into account for our system of governance, including long-term capital management, business planning and new product development. The results of the ORSA also contributes to various strategic decision-making including how best to optimize capital management, establishing the most appropriate premium levels and deciding whether to retain or transfer risks.

For further discussion of our risk management policies, see the Ceded Reinsurance section of "Critical Accounting Policies, Estimates and Recent Accounting Pronouncements" in Item 7.

REGULATION

General

Our insurance and reinsurance subsidiaries are subject to varying degrees of regulation and supervision in the various jurisdictions in which they operate. We are subject to extensive regulation under applicable statutes in these countries and any other jurisdictions in which we operate. The current material regulations under which we operate are described below. We may become subject in the future to regulation in new jurisdictions or to additional regulations in existing jurisdictions.

Bermuda

General. Our Bermuda insurance operating subsidiary, Arch Re Bermuda, is a Class 4 general business insurer and a Class C long-term insurer, and is subject to the Insurance Act 1978 of Bermuda and related regulations, as amended ("Insurance Act"). The Insurance Act imposes certain solvency and liquidity standards and auditing and reporting requirements and grants the BMA powers to supervise, investigate, require information and demand the production of documents and intervene in the affairs of insurance companies. Significant requirements include the appointment of an independent auditor, the appointment of a loss reserve specialist, the appointment of a principal representative in Bermuda, the filing of annual Statutory Financial Returns, the filing of annual financial statements in accordance with U.S. generally accepted accounting principles ("GAAP"), the filing of an annual capital and solvency return, compliance with minimum and enhanced capital requirements, compliance with certain restrictions on reductions of capital and the payment of dividends and distributions, compliance with group solvency and supervision rules, if applicable, and compliance with the Insurance Code of Conduct (relating to corporate governance, risk management and internal controls).

Arch Re Bermuda must also comply with a minimum liquidity ratio and minimum solvency margin in respect of its general business. The minimum liquidity ratio requires that the value of relevant assets must not be less than 75% of the amount of relevant liabilities. The minimum solvency margin, which varies depending on the class of the insurer, is determined as a percentage of either net reserves for losses and loss adjustment expenses ("LAE") or premiums or pursuant to a risk-based capital measure. Arch Re Bermuda is also subject to an enhanced capital requirement ("ECR") which is established by reference to either the Bermuda Solvency Capital Requirement model ("BSCR") or an approved internal capital model. The BSCR model is a risk-based capital model which provides a method for determining an insurer's capital requirements (statutory capital and surplus) by taking into account the risk characteristics of different aspects of the insurer's business. The BMA has established a target capital level for each Class 4 insurer equal to 120% of its enhanced capital requirement. While a Class 4 insurer is not currently required to maintain its available statutory economic capital and surplus at this level, the target capital level serves as an early warning tool for the BMA, and failure to maintain statutory capital at least equal to the target capital level will likely result in increased regulatory oversight. As a Class C insurer, Arch Re Bermuda is also required to maintain available statutory economic capital and surplus in respect of its long-term business at a level equal to or in excess of its long-term enhanced capital requirement which is established by reference to either the Class C BSCR model or an approved internal capital model.

Arch Re Bermuda is prohibited from declaring or paying any dividends during any financial year if it is in breach of its general business or long-term business enhanced capital requirements, minimum solvency margins or its general business minimum liquidity ratio or if the declaration or payment of such dividends would cause such a breach. If it has failed to meet its minimum solvency margins or minimum liquidity ratio on the last day of any financial year, Arch Re Bermuda will be prohibited, without the approval of the BMA, from declaring or paying any dividends during the next financial year. In addition, Arch Re Bermuda is prohibited from declaring or paying in any financial year dividends of more than 25% of its total statutory capital and surplus (as shown on its previous financial year's statutory balance sheet) unless it files (at least seven days before payment of such dividends) with the BMA an affidavit stating that it will continue to meet the required margins. Without the approval of the BMA, Arch Re Bermuda is prohibited from reducing by 15% or more its total statutory capital as set out in its previous year's financial statements and any application for such approval must include an affidavit stating that it will continue to meet the required margins.

The Insurance Amendment (No. 2) Act 2018 amended the Insurance Act to provide for the prior payment of policyholders' liabilities ahead of general unsecured creditors in the event of the liquidation or winding up of an insurer. The amendments provide inter alia that, subject to certain statutorily preferred debts, the insurance debts of an insurer must be paid in priority to all other unsecured debts of the insurer. Insurance debt is defined as a debt to which an insurer is or may become liable pursuant to an insurance contract excluding debts owed to an insurer under an insurance contract where the insurer is the person insured.

Group Supervision. The BMA acts as group supervisor of our group of insurance and reinsurance companies ("Group") and has designated Arch Re Bermuda as the designated insurer ("Designated Insurer"). As our Group supervisor, the BMA performs a number of functions including: (i) coordinating the gathering and dissemination of information for other regulatory authorities; (ii) carrying out supervisory reviews and assessments of our Group; (iii) carrying out assessments of our Group's compliance with the rules on solvency, risk concentration, intra-group transactions and good governance procedures; (iv) planning and coordinating, through regular meetings with other authorities, supervisory activities in respect of our Group; (v) coordinating any enforcement action that may need to be taken against our Group or any Group members; and (vi) coordinating meetings of colleges of supervisors in order to facilitate the carrying out of these functions. As Designated Insurer, Arch Re Bermuda is required to facilitate compliance by our Group with the group insurance solvency and supervision rules.

On an annual basis, the Group is required to file Group statutory financial statements, a Group statutory financial return, a Group capital and solvency return, audited Group financial statements, a Group Solvency Self-Assessment ("GSSA"), and a financial condition report with the BMA. The GSSA is designed to document our perspective on the capital resources necessary to achieve our business strategies and remain solvent, and to provide the BMA with insights on our risk management, governance procedures and documentation related to this process. In addition, the Designated Insurer is required to file quarterly group financial returns with the BMA. The Group is also required to maintain available Group statutory economic capital and surplus in an amount that is at least equal to the group enhanced capital requirement ("Group ECR") and the BMA has established a group target capital level equal to 120% of the Group ECR.

The BMA maintains supervision over the controllers of all Bermuda registered insurers, and accordingly, any person who, directly or indirectly, becomes a holder of at least 10%, 20%, 33% or 50% of our ordinary shares must notify the BMA in writing within 45 days of becoming such a holder (or ceasing to be such a holder). The BMA may object to such a person and require the holder to reduce its holding of ordinary shares and direct, among other things, that voting rights attaching to the ordinary shares shall not be exercisable.

Economic Substance Act. During 2017, the EU's Economic and Financial Affairs Council released a list of non-cooperative jurisdictions for tax purposes. The stated purpose of this list, and accompanying report, was to promote good governance worldwide in order to maximize efforts to prevent tax fraud and tax evasion. Bermuda was not on the list of non-cooperative jurisdictions, but was referenced in the report (along with approximately 40 other jurisdictions) as having committed to address concerns relating to economic substance by December 31, 2018. In accordance with that commitment, Bermuda enacted the Economic Substance Act 2018 (as amended) of Bermuda and its related regulations (together, the "ES Act"). The ES Act came into force on January 1, 2019, and provides that a registered entity other than an entity which is resident for tax purposes in certain jurisdictions outside Bermuda ("non-resident entity") that carries on as a business any one or more of the "relevant activities" referred to in the ES Act must comply with economic substance requirements. The list of "relevant activities" includes carrying on any one or more of the following activities: banking, insurance, fund management, financing, leasing, headquarters, shipping, distribution and service center, intellectual property and holding entities. Under the ES Act, if a company is engaged in one or more "relevant activities", it is required to maintain a substantial economic presence in Bermuda and to comply with the economic substance requirements set forth in the ES Act. A company will comply with those economic substance requirements if it: (a) is managed and directed in Bermuda; (b) undertakes "core income generating activities" (as may be prescribed under the ES Act) in Bermuda in respect of the relevant activity; (c) maintains adequate physical presence in Bermuda; (d) has adequate full time employees in Bermuda with suitable qualifications; and (e) incurs adequate operating expenditure in Bermuda in relation to the relevant activity undertaken by it.

Companies that carry on insurance as a relevant activity are generally considered to operate in Bermuda with adequate substance, with respect to their insurance business, if they comply with the existing provisions of (a) the Companies Act 1981 relating to corporate governance; and (b) the Insurance Act 1978, that are applicable to the economic substance requirements, and the Registrar will have regard to such companies' compliance with the Insurance Act 1978 (in addition to compliance with the Companies Act 1981) in his assessment of compliance with the economic substance requirements. That being said, such companies are still required to complete and file a Declaration Form, with the Bermuda Registrar of Companies and the Registrar will also have regard to the information provided in that Declaration Form in making his assessment of compliance with the ES Act.

Bermuda National Pension Scheme. The National Pension Scheme (Occupational Pensions) Amendment Act 2019 (the "NPS Amendment Act"), the provisions of which come into force on different dates, amends the existing legislation and regulations requiring employers to establish, register fund and maintain occupational pension plans. The NPS Amendment Act contains extensive amendments to the National Pension Scheme (Occupational Pensions) Act 1998 (the "NPS Act") as amended that enhance existing provisions and introduce new provisions including provisions relating to non-Bermudian employees, civil penalties, Guidance Notes and hardship benefits for persons who are retired.

The NPS Amendment Act extends the requirement to provide an occupational pension plan to all employees meeting the eligibility criteria, with the exception of a person granted permission under the Bermuda Immigration and Protection Act 1956 to engage in gainful occupation in Bermuda for less than an aggregate period not exceeding twelve months, with effect from March 2, 2020. Historically and until such date, employers must only provide an occupational pension plan to Bermudians and the husband or wife of a Bermudian.

United States

General. Our U.S. based insurance operating subsidiaries are subject to extensive governmental regulation and supervision by the states and jurisdictions in which they are domiciled, licensed and/or approved to conduct business. The insurance laws and regulations of the state of domicile have the most significant impact on operations. We currently have U.S. insurance and/or reinsurance subsidiaries domiciled in Delaware, North Carolina, Missouri, Wisconsin, Kansas and the District of Columbia. State insurance regulation and supervision is designed to protect policyholders rather than investors. Generally, state regulatory authorities have broad regulatory powers over such matters as licenses, standards of solvency, premium rates, policy forms, marketing practices, claims practices, investments, methods of accounting, form and content of financial statements, certain aspects of governance, ERM, amounts we are required to hold as reserves for future payments, minimum capital and surplus requirements, annual and other report filings and transactions among affiliates. Our U.S. based subsidiaries are required to file detailed quarterly statutory financial statements with state insurance regulators. In addition, regulatory authorities conduct periodic financial, claims and market conduct examinations. Certain insurance regulatory requirements are highlighted below. In addition to regulation applicable generally to U.S. insurance and reinsurance companies, our U.S. mortgage insurance operations are affected by federal and state regulation relating to mortgage insurers, mortgage lenders, and the origination, purchase and sale of residential mortgages. Arch Insurance (U.K.) is also subject to certain governmental regulation and supervision in the states where it writes excess and surplus lines insurance.

Holding Company Regulation. All states have enacted legislation that regulates insurance holding company systems. These regulations generally provide that each insurance company in the system is required to register with the insurance department of its state of domicile and furnish information concerning the operations of companies within the holding company system which may materially affect the operations, management or financial condition of the insurers within the system. Notice to the state insurance departments is required prior to the consummation of certain material transactions between an insurer and any entity in its holding company system and certain transactions may not be consummated without the applicable insurance department's prior approval or non-disapproval after receiving notice. The holding company acts also prohibit any person from directly or indirectly acquiring control of a U.S. insurance or reinsurance company unless that person has filed an application with specified information with such company's domiciliary commissioner and has obtained the commissioner's prior approval. Under most states' statutes acquiring 10% or more of the voting securities of an insurance company or its parent company is presumptively considered an acquisition of control of the insurance company, although such presumption may be rebutted.

The National Association of Insurance Commissioners ("NAIC") has adopted amendments to the Insurance Holding Company System Regulatory Act and Regulation, which, among other changes, introduce the concept of "enterprise risk" within an insurance holding company system. When the amendments are adopted by a particular state, the amended Insurance Holding Company System Regulatory Act and Regulation impose more extensive informational requirements on parents and other affiliates of licensed insurers or reinsurers with the purpose of protecting them from enterprise risk, including requiring an annual enterprise risk report by the ultimate controlling person identifying the material risks within the insurance holding company system that could pose enterprise risk to the licensed companies and requiring a person divesting its controlling interest to make a confidential advance notice filing.

Regulation of Dividends and Other Payments from Insurance Subsidiaries. The ability of an insurer to pay dividends or make other distributions is subject to insurance regulatory limitations of the insurer's state of domicile. Such laws generally limit the payment of dividends or other distributions above a specified level. Dividends or other distributions in excess of such thresholds are "extraordinary" and are subject to prior notice and approval, or non-disapproval after receiving notice.

Credit for Reinsurance. Arch Re U.S. is subject to insurance regulation and supervision that is similar to the regulation of licensed primary insurers. However, except for certain mandated provisions that must be included in order for a ceding company to obtain credit for reinsurance ceded, the terms and conditions of reinsurance agreements generally are not subject to regulation by any governmental authority.

A primary insurer ordinarily will enter into a reinsurance agreement only if it can obtain credit for the reinsurance ceded on its U.S. statutory-basis financial statements. As a result of the requirements relating to the provision of credit for reinsurance, and Arch Re U.S. and Arch Re Bermuda are indirectly subject to certain regulatory requirements imposed by jurisdictions in which ceding companies are domiciled.

In general, credit for reinsurance is allowed if the reinsurer is licensed or "accredited" in the state in which the primary insurer is domiciled; or if none of the above applies, to the extent that the reinsurance obligations of the reinsurer are collateralized appropriately, typically through the posting of a letter of credit for the benefit of the primary insurer or the deposit of assets into a trust fund established for the benefit of the primary insurer. Most states have adopted provisions of the NAIC Credit for Reinsurance Model Law and Regulation that allow full credit to U.S. ceding insurers for reinsurance ceded to reinsurers that have been approved as "certified reinsurers" based upon less than 100% collateralization. Arch Re Bermuda is approved as a "certified reinsurer" in 35 states.

In April 2018, the U.S. and the EU entered into the Bilateral Agreement between the United States of America and the European Union on Prudential Matters Regarding Insurance and Reinsurance (the "EU-US Covered Agreement") that, among other things, would eliminate reinsurance collateral requirements for qualified U.S. reinsurers operating in the EU insurance market, and eliminate reinsurance collateral requirements for qualified EU reinsurers operating in the U.S. insurance market. In December 2018, the U.S. Secretary of the Treasury and the U.S. Trade Representative announced that they had reached agreement with the U.K. on a covered agreement ("U.K. Covered Agreement") that would extend terms nearly identical to the EU Covered Agreement to insurers and reinsurers operating in the U.K. should the United Kingdom ultimately leave the EU. The NAIC has adopted amendments to the Credit for Reinsurance Model Law and Regulation that would implement the EU-US Covered Agreement and the U.K. Covered Agreement and eliminate reinsurance collateral requirements for qualified reinsurers domiciled in other jurisdictions deemed "Reciprocal Jurisdictions". The NAIC has published a list of Reciprocal Jurisdictions that includes Bermuda, but it is possible that one or more states that adopt the amended Credit for Reinsurance Model Law and Regulation may not accept Bermuda as a Reciprocal Jurisdiction.

Risk Management and ORSA. In 2012, the NAIC adopted the Risk Management and Own Risk and Solvency Assessment Model Act, which requires domestic insurers to maintain a risk management framework and establishes a legal requirement for domestic insurers to conduct an ORSA in accordance with the NAIC's ORSA Guidance Manual. The ORSA Model Act provides that domestic insurers, or their insurance group, must regularly conduct an ORSA consistent with a process comparable to the ORSA Guidance Manual process. The ORSA Model Act also provides that, no more than once a year, an insurer's domiciliary regulator may request that an insurer submit an ORSA summary report, or any combination of reports that together contain the information described in the ORSA Guidance Manual, with respect to the insurer and/or the insurance group of which it is a member. If and when the ORSA Model Act is adopted by an individual state, the state may impose additional internal review and regulatory filing requirements on licensed insurers and their parent companies.

Cybersecurity and Privacy. The NAIC has adopted an Insurance Data Security Model Law, which, when adopted by the states, will require insurers, insurance producers and other entities required to be licensed under state insurance laws to comply with certain requirements under state insurance laws, such as developing and maintaining a written information security program, conducting risk assessments and overseeing the data security practices of third-party vendors. In addition, certain state insurance regulators are developing or have developed regulations that may impose regulatory requirements relating to cybersecurity on insurance and reinsurance companies (potentially including insurance and reinsurance companies that are not domiciled, but are licensed, in the relevant state). For example, the New York State Department of Financial Services has adopted a regulation pertaining to cybersecurity for all banking and insurance entities under its jurisdiction, effective as of March 1, 2017, which applies to us. Privacy legislation and regulation has also become an issue of increasing focus in many states. In addition, the California legislature passed the California Consumer Privacy Act of 2018,("CCPA") which also applies to us, came into effect on January 1, 2020, and grants California consumers certain rights to, among other things, access and delete data about them subject to certain exceptions, as well as a private right of action with statutory penalties. Additional privacy laws expanding CCPA have already been proposed in California, and a range of new privacy laws are also under consideration in other states, as well as by the federal government. We cannot predict the impact these evolving laws and regulations may have on our business, financial condition or results of operations, but we could incur additional costs resulting from compliance with such laws and regulations.

Risk-Based Capital Requirements. Licensed U.S. property and casualty insurance and reinsurance companies are subject to risk-based capital requirements that are designed to assess capital adequacy and to raise the level of protection that statutory surplus provides for policyholder obligations. The risk-based capital model for property and casualty insurance companies measures three major areas of risk facing property and casualty insurers: underwriting, which encompasses the risk of adverse loss developments and inadequate pricing; declines in asset values arising from credit risk; and declines in asset values arising from investment risks. An insurer will be subject to varying degrees of regulatory action depending on how its statutory surplus compares to its risk-based capital calculation. Under the approved formula, an insurer's total adjusted capital is compared to its authorized control level risk-based capital. If this ratio is above a minimum threshold, no company or regulatory action is necessary. Below this threshold are four distinct action levels at which an insurer's domiciliary state regulator can intervene with increasing degrees of authority over an insurer as the ratio of surplus to risk-based capital requirement decreases. The mildest regulatory action requires an insurer to submit a plan for corrective action; the most severe requires an insurer to be rehabilitated or liquidated.

Our mortgage insurance operations are not currently subject to state risk-based capital requirements, but rather are subject to state risk to capital or minimum policyholder position requirements. The NAIC has established a Mortgage Guaranty Insurance Working Group which is engaged in developing changes to the Mortgage Guaranty Insurers Model Act, including the development of a risk based capital model unique to mortgage guaranty insurers.

Guaranty Funds. Most states require all admitted insurance companies to participate in their respective guaranty funds which cover certain claims against insolvent insurers. Solvent insurers licensed in these states are required to cover the losses paid on behalf of insolvent insurers by the guaranty funds and are generally subject to annual assessments in the states by the guaranty funds to cover these losses. Mortgage guaranty insurance, among other lines of business, is typically exempt from participation in guaranty funds.

Federal Regulation. Although state regulation is the dominant form of regulation for insurance and reinsurance business, a number of federal laws affect and apply to the insurance industry. The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 ("Dodd-Frank") created the Federal Insurance Office ("FIO") within the Department of Treasury, which is not a federal regulator or supervisor of insurance, but monitors the insurance industry for systemic risk, administers the Terrorism Risk Insurance Program ("TRIP"), consults with the states regarding insurance matters and develops federal policy on aspects of international insurance matters. See "Risk Factors—Risks Related to Our Industry-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" for more information on TRIP. In addition, FIO is authorized to assist the U.S. Secretary of the Treasury in negotiating "covered agreements" between the U.S. and one or more foreign governments or regulatory authorities that address insurance prudential measures.

Certain other federal laws also directly or indirectly impact mortgage insurers, including the Real Estate Settlement Procedures Act of 1974 ("RESPA"), the Homeowners Protection Act of 1998 ("HOPA"), the Equal Credit Opportunity Act, the Fair Housing Act, the Truth In Lending Act ("TILA"), the Fair Credit Reporting Act of 1970 ("FCRA"), and the Fair Debt Collection Practices Act. Among other things, these laws and their implementing regulations prohibit payments for referrals of settlement service business, require fairness and non-discrimination in granting or facilitating the granting of credit, govern the circumstances under which companies may obtain and use consumer credit information, define the manner in which companies may pursue collection activities, and require disclosures of the cost of credit and provide for other consumer protections.

GSE Eligible Mortgage Insurer Requirements. GSEs impose requirements on private mortgage insurers so that they may be eligible to insure loans sold to the GSEs, known as the Private Mortgage Insurer Eligibility Requirements ("PMIERs"). The PMIERs apply to our eligible mortgage insurers, but do not apply to Arch Mortgage Guaranty Company, which is not GSE-approved. The PMIERs impose limitations on the type of risk insured, the forms and insurance policies issued, standards for the geographic and customer diversification of risk, procedures for claims handling, acceptable underwriting practices, standards for certain reinsurance cessions and financial requirements, among other things. 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). Our eligible mortgage insurers satisfied the PMIERs' financial requirements as of December 31, 2019.

Canada

Arch Insurance Canada and Arch Re Canada are subject to federal, as well as provincial and territorial, regulation in Canada in the provinces and territories in which they underwrite insurance/reinsurance. The Office of the Superintendent of Financial Institutions ("OSFI") is the federal regulatory body that, under the Insurance Companies Act (Canada), prudentially regulates federal Canadian and non-Canadian insurance and reinsurance companies operating in Canada. Arch Insurance Canada is licensed to carry on insurance business by OSFI and in each province and territory. Arch Re Canada is licensed to carry on reinsurance business by OSFI and in the provinces of Ontario and Quebec.

Under the Insurance Companies Act (Canada), Arch Insurance Canada is required to maintain an adequate amount of capital in Canada, calculated in accordance with a test promulgated by OSFI called the Minimum Capital Test, and Arch Re Canada is required to maintain an adequate margin of assets over liabilities in Canada, calculated in accordance with a test promulgated by OSFI called the Branch Adequacy of Assets Test. OSFI has implemented a risk-based methodology for assessing insurance/reinsurance companies operating in Canada known as its "Supervisory Framework." In applying the Supervisory Framework, OSFI considers the inherent risks of the business and the quality of risk management for each significant activity of each operating entity. Under the Insurance Companies Act (Canada), approval of the Minister of Finance (Canada) is required in connection with certain acquisitions of shares of, or control of, Canadian insurance companies such as Arch Insurance Canada, and notice to and/or approval of OSFI is required in connection with the payment of dividends by or redemption of shares by Canadian insurance companies such as Arch Insurance Canada.

United Kingdom

General. The Prudential Regulation Authority ("PRA") and the Financial Conduct Authority ("FCA") regulate insurance and reinsurance companies and the FCA regulates firms carrying on insurance mediation activities operating in the U.K. both under the Financial Services and Markets Act 2000 (the "FSMA"). In May 2004, Arch Insurance (U.K.) (formerly Arch Insurance Company (Europe) Limited) was granted the relevant permissions for the classes of insurance business which it underwrites in the U.K. In 2009, AUAL was licensed and authorized by the relevant U.K. regulator and the Lloyd's Franchise Board and holds the relevant permissions for the classes of insurance business which are underwritten in the U.K. by Arch Syndicate 2012. Arch Syndicate 2012 has one corporate member (the legal entity through which Funds at Lloyd's are deposited), Arch Syndicate Investments Ltd. ("ASIL"). The Lloyd's syndicates managed by BMAL have 11 corporate members. All U.K. companies are also subject to a range of statutory provisions, including the laws and regulations of the Companies Act 2006 (as amended) (the "U.K. Companies Act").

The objectives of the PRA are to promote the safety and soundness of all firms it supervises and to secure an appropriate degree of protection for policyholders. The objectives of the FCA are to ensure customers receive financial services and products that meet their needs, to promote sound financial systems and markets and to ensure that firms are stable and resilient with transparent pricing information and which compete effectively and have the interests of their customers and the integrity of the market at the heart of how they run their business. The PRA has responsibility for the prudential regulation of banks and insurers, while the FCA has responsibility for the conduct of business regulation in the wholesale and retail markets. The PRA and the FCA adopt separate methods of assessing regulated firms on a periodic basis. Arch Insurance (U.K.), AUAL and BMAL are subject to periodic assessment by the PRA along with all regulated firms. Arch Insurance (U.K.), AUAL and BMAL are subject to regulation by both the PRA and FCA. Castel is authorized and regulated by the FCA and is subject to periodic assessment and review by the FCA.

Lloyd's Supervision. The operations of AUAL (as managing agent of Arch Syndicate 2012) and BMAL (as managing agent of Barbican Syndicate 1955 and Arcus Syndicate 1856) and each syndicate's respective corporate members, are subject to the byelaws and regulations made by (or on behalf of) the Council of Lloyd's, and requirements made under those byelaws. The Council of Lloyd's, established in 1982 by Lloyd's Act 1982, has overall responsibility and control of Lloyd's. Those byelaws, regulations and requirements provide a framework for the regulation of the Lloyd's market, including specifying conditions in relation to underwriting and claims operations of Lloyd's participants. Lloyd's is also subject to the provisions of the FSMA. Lloyd's is authorized by the PRA and regulated by the PRA and FCA. Those entities acting within the Lloyd's market are required to comply with the requirements of the FSMA and provisions of the PRA's or FCA's rules, although the PRA has delegated certain of its powers, including some of those relating to prudential requirements, to Lloyd's. Each corporate member of Lloyd's is required to contribute a percentage of the member's premium income for each year of account to the Lloyd's central fund. The Lloyd's central fund is available if members of Lloyd's assets are not sufficient to meet claims for which the member is liable. Each corporate member of Lloyd's, may also be required to contribute to the central fund by way of a supplement to a callable layer of up to 3% of the corresponding member's premium income limit for the relevant year of account. In addition, ASIL as a member of Arch Syndicate 2012, and Barbican Corporate Member Limited, as a member of Barbican Syndicate 1955, are each approved to underwrite excess and surplus lines insurance in most states in the U.S. through Lloyd's licenses. Such activities must be in compliance with the Lloyd's requirements.

Financial Resources. The European solvency framework and prudential regime for insurers and reinsurers, the Solvency II Directive 2009/138/EC ("Solvency II"), took effect in full on January 1, 2016. See "European Union—Insurance and Reinsurance Regulatory Regime" below for additional details.

Arch Insurance (U.K.), AUAL (on behalf of Arch Syndicate 2012) and BMAL (on behalf of Barbican Syndicate 1955) are currently required to meet economic risk-based solvency requirements imposed under Solvency II. Solvency II, together with European Commission "delegated acts" and guidance issued by the European Insurance and Occupational Pensions Authority ("EIOPA") sets out classification and eligibility requirements, including the features which capital must display in order to qualify as regulatory capital.

Financial Services Compensation Scheme. The Financial Services Compensation Scheme ("FSCS") is a scheme established under FSMA to compensate eligible policyholders of insurance companies who may become insolvent. The FSCS is funded by the levies that it has the power to impose on all insurers. Arch Insurance (U.K.) could be required to pay levies to the FSCS.

Restrictions on Acquisition of Control. Under FSMA, the prior consent of the PRA or FCA, as applicable, is required, before any person can become a controller or increase its control over any regulated company, including Arch Insurance (U.K.) and AUAL, or over the parent undertaking of any regulated company. Therefore, the PRA's or FCA's prior consent, as applicable, is required before any person can become a controller of Arch Capital. Prior consent is also required from Lloyd's before any person can become a controller or increase its control over a corporate member or a managing agent or a parent undertaking of a corporate member or managing agent. A controller is defined for these purposes as a person who holds (either alone or in concert with others) 10% or more of the shares or voting power in the relevant company or its parent undertaking.

Restrictions on Payment of Dividends. Under English law, all companies are restricted from declaring a dividend to their shareholders unless they have "profits available for distribution." The calculation as to whether a company has sufficient profits is based on its accumulated realized profits minus its accumulated realized losses. U.K. insurance regulatory laws do not prohibit the payment of dividends, but the PRA or FCA, as applicable, requires that insurance companies, insurance intermediaries and other regulated entities maintain certain solvency margins and may restrict the payment of a dividend by Arch Insurance (U.K.), BMAL and Castel.

European Union Considerations. Following the referendum in June 2016 in which a majority of voting U.K. citizens voted in favor of the U.K. leaving the EU and the approval of the Withdrawal Agreement by both the U.K. Parliament and the EU Parliament, the U.K. withdrew from the EU on January 31, 2020 ("Brexit"). The terms of Brexit are set forth in the Withdrawal Agreement and provide for a transition period of 11 months from January 31, 2020 until December 31, 2020 (unless a single extension of one to two years to this transition period is agreed between the U.K. government and the EU by June 30, 2020, although the U.K. government has indicated that no extension will be sought) during which time the U.K. will remain in the EU customs union and single market ("Transition Period"). During the Transition Period, there will be no change in passporting rights for financial institutions in the U.K. This authorization enables Arch Insurance (U.K.) and AUAL to exercise "passporting" rights to establish a branch in any other Member State of the EU, where such entity will be subject to the insurance regulations of each such Member State with respect to the conduct of its business in such Member State, but remain subject only to the financial and operational supervision by the PRA or FCA (as applicable). Through their respective authorizations in the U.K., Arch Insurance (U.K.)'s, AUAL's, BMAL's and Castel's authorizations are currently recognized throughout the European Economic Area ("EEA"), subject only to certain notification and application requirements. The conditions for the establishment of branches in Member States of the EU are set out in Solvency II. Arch Insurance (U.K.) currently has branches in Germany, Italy, Spain and Denmark. During the Transition Period, through their passporting rights, our companies authorized in the U.K. will continue to have the freedom to provide insurance services anywhere in the EEA subject to compliance with certain rules governing such provision, including notification to the PRA or FCA, as applicable. Under our Brexit plan, from January 2020, all of the EU insurance business of Arch Insurance (U.K.) is conducted by Arch Insurance (EU).

Unless the Transition Period is extended beyond December 31, 2020 (of which any single extension of one to two years must be agreed between the U.K. government and the EU by June 30, 2020), there will be a loss of passporting rights for financial institutions in the U.K., except to the extent that any aspect of the regime is preserved in a separate agreement between the EU and the U.K. The long-term implications of Brexit on the Solvency II framework in the U.K. are uncertain after the expiration of the Transition Period. See "Risk Factors—Risks Relating to Our Industry—The U.K.'s Withdrawal from the EU could adversely affect us."

Ireland

General. The CBOI regulates insurance and reinsurance companies and intermediaries authorized in Ireland. Our three Irish operating subsidiaries are Arch Re Europe, Arch Insurance (EU) and Arch Underwriters Europe. Arch Re Europe was licensed and authorized by the CBOI as a non-life reinsurer in October 2008 and as a life reinsurer in November 2009. Arch Insurance (EU) was licensed and authorized by the CBOI as a non-life insurer in December 2011. As part of our Brexit planning, it was decided that Arch Insurance (EU) would became the platform for Arch's EU non-life insurance business. A change in business plan application was submitted to the CBOI and approval was received in February 2019. Arch Mortgage Insurance Designated Activity Company name was changed to Arch Insurance (EU) to reflect the expanded nature of the company's operations. Arch Underwriters Europe was registered by the CBOI as an insurance and reinsurance intermediary in July 2014. Arch Re Europe, Arch Insurance (EU) and Arch Underwriters Europe are subject to the supervision of the CBOI and must comply with Irish insurance acts and regulations as well as with directions and guidance issued by the CBOI.

Arch Re Europe and Arch Insurance (EU) are required to comply with Solvency II requirements. See "European Union —Insurance and Reinsurance Regulatory Regime" below for additional details. As an intermediary, Arch Underwriters Europe is subject to a different regulatory regime and is not subject to solvency capital rules, but must comply with requirements such as to maintain professional indemnity insurance and to have directors that are fit and proper. Our Irish subsidiaries are also subject to the general body of Irish company laws and regulations including the provisions of the Companies Act 2014.

Financial Resources. Arch Re Europe and Arch Insurance (EU) are required to meet economic risk-based solvency requirements imposed under Solvency II. Solvency II, together with European Commission "delegated acts" and guidance issued by EIOPA sets out classification and eligibility requirements, including the features which capital must display in order to qualify as regulatory capital.

Restrictions on Acquisitions. Under Irish law, the prior consent of the CBOI is required before any person can acquire or increase a qualifying holding in an Irish insurer or reinsurer, including Arch Insurance (EU) and Arch Re Europe, or their parent undertakings. A qualifying holding is defined for these purposes as a direct or indirect holding that represents 10% or more of the capital of, or voting rights, in the undertaking or makes it possible to exercise a significant influence over the management of the undertaking.

Restrictions on Payment of Dividends. Under Irish company law, Arch Re Europe, Arch Insurance (EU) and Arch Underwriters Europe are permitted to make distributions only out of profits available for distribution. A company's profits available for distribution are its accumulated, realized profits, so far as not previously utilized by distribution or capitalization, less its accumulated, realized losses, so far as not previously written off in a reduction or reorganization of capital duly made. Further, the CBOI has powers to intervene if a dividend payment were to lead to a breach of regulatory capital requirements.

European Union Considerations. As Arch Re Europe, Arch Insurance (EU) and Arch Underwriters Europe are authorized by the CBOI in Ireland, a Member State of the EU, those authorizations are recognized throughout the EEA. Subject only to certain notification and application requirements, Arch Re Europe, Arch Insurance (EU) and Arch Underwriters Europe can provide services, or establish a branch, in any other Member State of the EEA. Although, in doing so, they may be subject to the laws of such Member States with respect to the conduct of business in such Member State, company law registrations and other matters, they will remain subject to financial and operational supervision by the CBOI only. Arch Re Accident & Health ApS ("Arch Re Denmark") is an underwriting agency underwriting accident and health business for Arch Re Europe in Denmark. Arch Re Europe also has a branch in the U.K., which underwrites non-life reinsurance risk for Arch Re Europe. Arch Re Europe also has a branch outside the EEA, Arch Reinsurance Europe Designated Activity Company, Dublin (Ireland), Zurich Branch ("Arch Re Europe Swiss Branch").

As part of its application for registration, Arch Underwriters Europe requested the CBOI to make the necessary notifications to permit it to provide insurance and reinsurance intermediary services in all EEA Member States. Arch Underwriters Europe currently has branches in the following EU countries: the U.K., Italy and Finland.

Following Brexit and the end of the Transition Period, the U.K.'s withdrawal from the EU will lead to a loss of passporting rights for EEA financial institutions (including our Irish operating subsidiaries) into the U.K., except to the extent that any aspect of the regime is preserved in a separate agreement between the EU and the U.K. Absent such agreement, the post-Brexit status and rules applicable to U.K. branches of EEA financial institutions will be primarily driven by U.K. law and regulation. See "Risk Factors—Risks Relating to Our Industry—The U.K.'s Withdrawal from the EU could adversely affect us."

European Union

Insurance and Reinsurance Regulatory Regime. Solvency II took effect in full on January 1, 2016. Solvency II imposes economic risk-based solvency requirements across all EU Member States and consists of three pillars: Pillar I-quantitative capital requirements, based on a valuation of the entire balance sheet; Pillar II-qualitative regulatory review, which includes governance, internal controls, enterprise risk management and supervisory review process; and Pillar III-market discipline, which is accomplished through reporting of the insurer's financial condition to regulators and the public. Solvency II is supplemented by European Commission Delegated Regulation (EU) 2015/35 (the "Delegated Regulation"), other European Commission "delegated acts" and binding technical standards, and guidelines issued by EIOPA. The Delegated Regulation sets out more detailed requirements for individual insurance and reinsurance undertakings, as well as for groups, based on the overarching provisions of Solvency II, which together make up the core of the single prudential rulebook for insurance and reinsurance undertakings in the EU.

Following Brexit, the U.K.'s withdrawal from the EU will lead to a loss of passporting rights from U.K. financial institutions into the EU, except to the extent that any aspect of the regime is preserved in a separate agreement between the U.K. and the EU. See "Risk Factors—Risks Relating to Our Industry—The U.K.'s Withdrawal from the EU could adversely affect us."

Arch Re Europe and Arch Insurance (EU), being established in Ireland and authorized by the CBOI are able, subject to similar regulatory notifications and there being no objection from the CBOI and the Member States concerned, to establish branches and provide reinsurance services, and, in respect of Arch Insurance (EU), insurance services in all EEA states.

Solvency II does not prohibit EEA insurers from obtaining reinsurance from reinsurers licensed outside the EEA, such as Arch Re Bermuda. As such, and subject to the specific rules in each Member State, Arch Re Bermuda may do business from Bermuda with insurers in EEA Member States, but it may not directly operate its reinsurance business within the EEA. Article 172 of Solvency II provides that reinsurance contracts concluded by insurance undertakings in the EEA with reinsurers having their head office in a country whose solvency regime has been determined to be equivalent to Solvency II shall be treated in the same manner as reinsurance contracts with undertakings in the EEA authorized under Solvency II. In this regard, with effect from January 1, 2016, the supervisory regime, including the solvency regime, in Bermuda has been determined to be equivalent to that laid down in Solvency II, except in relation to captives and special purpose insurers. Solvency II also includes specific measures providing for the supervision of insurance and reinsurance groups. However, as a consequence of the above determination of equivalence, pursuant to Article 260 of Solvency II, regulators within the EEA are required to rely on the worldwide group supervision exercised by the BMA. EIOPA has also indicated that, on a case by case basis, groups subject to this worldwide supervision may be exempted from any EEA sub-group supervision, where this results in more efficient supervision of the group and does not impair EEA supervisors in respect of their individual responsibilities.

The Insurance Distribution Directive ("IDD") was published in February 2016. EEA Member States were required to transpose the IDD by October 1, 2018. It replaces the existing Insurance Mediation Directive. The IDD applies to all distributors of insurance and reinsurance products (including insurers and reinsurers selling directly to customers) and strengthens the regulatory regime applicable to distribution activities through increased transparency, information and conduct requirements. The principal impact of the IDD is on the insurance market, however, requirements that apply across insurance and reinsurance include more specific conditions regarding knowledge and continuing professional development requirements for those involved in distribution of (re)insurance products. The IDD continues the existing ability for intermediaries established in a Member State of the EU to establish branches and provide services to all EEA states. Arch Underwriters Europe, being established in Ireland and authorized by the CBOI, is able, subject to regulatory notifications and there being no objection from the CBOI, to establish branches and provide services in all EEA states.

Privacy. The European General Data Protection Regulation (the "GDPR") came into effect on May 25, 2018. The GDPR aims to introduce consistent data protection rules across the EU and EEA, and its scope extends to certain entities not established in the EEA if they process personal data or offer goods or services to, or monitor the behavior of, EEA data subjects. The GDPR contains a number of requirements regarding the processing of personal data about individuals, including mandatory security breach reporting, new and strengthened individual rights, evidenced data controller accountability for compliance with the GDPR principles (including fairness and transparency), maintenance of data processing activity records and the implementation of "privacy by design," including through the completion of mandatory Data Protection Impact Assessments in connection with higher risk data processing activities.

Switzerland

In December 2008, Arch Re Europe opened Arch Re Europe Swiss Branch as a branch office. As Arch Re Europe is domiciled outside of Switzerland and its activities are limited to reinsurance, the Arch Re Europe Swiss Branch in Switzerland is not required to be licensed by the Swiss insurance regulatory authorities.

In August 2014, Arch Underwriters Europe opened a branch office in Zurich ("Arch Underwriters Europe Swiss Branch") to render reinsurance advisory services to certain group companies. Arch Underwriters Europe Swiss Branch is registered with the commercial register of the Canton of Zurich. Since its activities are limited to advisory services for reinsurance matters, the Arch Underwriters Europe Swiss Branch is not required to be licensed by the Swiss insurance regulatory authorities.

Australia

APRA is an independent statutory authority that supervises institutions across banking, insurance and superannuation and promotes financial stability in Australia. Arch LMI was authorized by APRA in January 2019 to conduct monoline lenders' mortgage insurance business in Australia. Major regulatory requirements that are applicable to Arch LMI as an insurance provider in Australia include requirements on minimum capital levels and compliance with corporate governance standards, including the risk management strategy for our Australian mortgage insurance business.

Hong Kong

The Hong Kong insurance industry is regulated by the Insurance Authority, the regulatory authority established pursuant to the Insurance Ordinance (Cap. 41), whose principal function is to regulate and supervise the insurance industry for the promotion of the general stability of the insurance industry and for the protection of existing and potential policyholders. Arch MI Asia is authorized to carry on general business Class 14 (Credit) and Class 16 (Miscellaneous Financial Loss), in or from Hong Kong.

Major regulatory requirements that are applicable to Arch MI Asia as a general business insurer include requirements on minimum paid-up capital, minimum solvency margin and maintenance of assets in Hong Kong.

TAX MATTERS

The following summary of the taxation of Arch Capital and the taxation of our shareholders is based upon current law and is for general information only. Legislative, judicial or administrative changes may be forthcoming that could affect this summary.

The following legal discussion (including and subject to the matters and qualifications set forth in such summary) of certain tax considerations (a) under "—Taxation of Arch Capital—Bermuda" and "—Taxation of Shareholders—Bermuda" is based upon the advice of Conyers Dill & Pearman Limited, Hamilton, Bermuda and (b) under "—Taxation of Arch Capital-United States," "—Taxation of Shareholders-United States Taxation," "—Taxation of Our U.S. Shareholders" and "—United States Taxation of Non-U.S. Shareholders" is based upon the advice of Cahill Gordon & Reindel LLP, New York, New York (the advice of such firms does not include accounting matters, determinations or conclusions relating to the business or activities of Arch Capital). The summary is based upon current law and is for general information only. The tax treatment of a holder of our common or preferred shares, or of a person treated as a holder of our shares for U.S. federal income, state, local or non-U.S. tax purposes, may vary depending on the holder's particular tax situation. Legislative, judicial or administrative changes or interpretations may be forthcoming that could be retroactive and could affect the tax consequences to us or to holders of our shares.

Taxation of Arch Capital

Bermuda. Under current Bermuda law, Arch Capital is not subject to tax on income or profits, withholding, capital gains or capital transfers. Arch Capital has obtained from the Minister of Finance under the Exempted Undertakings Tax Protection Act 1966 of Bermuda an assurance that, in the event that Bermuda enacts legislation imposing tax computed on profits, income, any capital asset, gain or appreciation, or any tax in the nature of estate duty or inheritance, the imposition of any such tax shall not be applicable to Arch Capital or to any of our operations or our shares, debentures or other obligations until March 31, 2035. We could be subject to taxes in Bermuda after that date. This assurance will be subject to the proviso that it is not to be construed so as to prevent the application of any tax or duty to such persons as are ordinarily resident in Bermuda (we are not so currently affected) or to prevent the application of any tax payable in accordance with the provisions of the Land Tax Act 1967 of Bermuda or otherwise payable in relation to any property leased to us or our insurance subsidiary. We pay annual Bermuda government fees, and our Bermuda insurance and reinsurance subsidiary pays annual insurance license fees. In addition, all entities employing individuals in Bermuda are required to pay a payroll tax and other sundry taxes payable, directly or indirectly, to the Bermuda government.

United States. Arch Capital and its non-U.S. subsidiaries intend to conduct their operations in a manner that will not cause them to be treated as engaged in a trade or business in the U.S. and, therefore, will not be required to pay U.S. federal income taxes (other than U.S. excise taxes on insurance and reinsurance premium and withholding taxes on dividends and certain other U.S. source investment income). However, because definitive identification of activities which constitute being engaged in a trade or business in the U.S. is not provided by the Internal Revenue Code of 1986, as amended (the “Code”), or regulations or court decisions, there can be no assurance that the U.S. Internal Revenue Service (“IRS”) will not contend successfully that Arch Capital or its non-U.S. subsidiaries are or have been engaged in a trade or business in the U.S. A foreign corporation deemed to be so engaged would be subject to U.S. federal income tax, as well as the branch profits tax, on its income, which is treated as effectively connected with the conduct of that trade or business unless the corporation is entitled to relief under the permanent establishment provisions of a tax treaty. Such income tax, if imposed, would be based on effectively connected income computed in a manner generally analogous to that applied to the income of a domestic corporation, except that deductions and credits generally are not permitted unless the foreign corporation has timely filed a U.S. federal income tax return in accordance with applicable regulations. Penalties may be assessed for failure to file tax returns. The 30% branch profits tax is imposed on net income after subtracting the regular corporate tax and making certain other adjustments.

Under the income tax treaty between Bermuda and the U.S. (the “Treaty”), Arch Capital's Bermuda insurance subsidiaries will be subject to U.S. income tax on any insurance premium income found to be effectively connected with a U.S. trade or business only if that trade or business is conducted through a permanent establishment in the U.S. No regulations interpreting the Treaty have been issued. While there can be no assurances, Arch Capital does not believe that any of its Bermuda insurance subsidiaries has a permanent establishment in the U.S. Such subsidiaries would not be entitled to the benefits of the Treaty if (i) 50% or less of Arch Capital's shares were beneficially owned, directly or indirectly, by Bermuda residents or U.S. citizens or residents, or (ii) any such subsidiary's income were used in substantial part to make disproportionate distributions to, or to meet certain liabilities to, persons who are not Bermuda residents or U.S. citizens or residents. While there can be no assurances, Arch Capital believes that its Bermuda insurance subsidiaries are eligible for Treaty benefits.

The Treaty clearly applies to premium income, but may be construed as not protecting investment income. If Arch Capital’s Bermuda insurance subsidiaries were considered to be engaged in a U.S. trade or business and were entitled to the benefits of the Treaty in general, but the Treaty were not found to protect investment income, a portion of such subsidiaries’ investment income could be subject to U.S. federal income tax.

Non-U.S. insurance companies carrying on an insurance business within the U.S. have a certain minimum amount of effectively connected net investment income, determined in accordance with a formula that depends, in part, on the amount of U.S. risk insured or reinsured by such companies. If any of Arch Capital's non-U.S. insurance subsidiaries is considered to be engaged in the conduct of an insurance business in the U.S., a significant portion of such company's investment income could be subject to U.S. federal income tax.

Non-U.S. corporations not engaged in a trade or business in the U.S. are nonetheless subject to U.S. income tax on certain “fixed or determinable annual or periodic gains, profits and income” derived from sources within the U.S. as enumerated in Section 881(a) of the Code (such as dividends and certain interest on investments), subject to exemption under the Code or reduction by applicable treaties.

The U.S. also imposes an excise tax on insurance and reinsurance premiums paid to non-U.S. insurers or reinsurers with respect to risks located in the U.S. The rates of tax, unless reduced by an applicable U.S. tax treaty, are 4% for non-life insurance premiums and 1% for life insurance and all reinsurance premiums.

The Tax Cuts and Jobs Act of 2017 (the “Tax Cuts Act”) was signed into law by the President of the United States in 2017. For taxable years beginning after 2017, the Tax Cuts Act imposes a 10% minimum base erosion and anti-abuse tax (increased to 12.5% for the 2026 taxable year and the subsequent taxable years) on the “modified taxable income” of a U.S. corporation (or a non-U.S. corporation engaged in a U.S. trade or business) over such corporation’s regular U.S. federal income tax, reduced by certain tax credits. The “modified taxable income” of a corporation is determined without deduction for certain payments by such corporation to its non-U.S. affiliates (including reinsurance premiums). Final regulations interpreting the base erosion and anti-abuse tax were issued in December 2019.

United Kingdom. Our U.K. subsidiaries are companies incorporated and have their central management and control in the U.K., and are therefore resident in the U.K. for corporation tax purposes. As a result, they will be subject to U.K. corporation tax on their respective profits. The U.K. branches of Arch Re Europe and Arch Insurance (EU) will be subject to U.K. corporation tax on the profits (both income profits and chargeable gains) attributable to each branch. The rate of U.K. corporation tax for the financial year is 19% on profits.

Canada. Arch Insurance Canada, a Canadian federal insurance company, commenced underwriting in 2013. Arch Re U.S., through a branch, commenced underwriting reinsurance in Canada in January 2015. Arch Insurance Canada is taxed on its worldwide income. Arch Re U.S. is taxed on its net business income earned in Canada. The general federal corporate income tax rate in Canada is currently 15%. Provincial and territorial corporate income tax rates are added to the general federal corporate income tax rate and generally vary between 10% and 16%.

Ireland. Each of Arch Re Europe, Arch Insurance (EU) and Arch Underwriters Europe is incorporated and resident in Ireland for corporation tax purposes and will be subject to Irish corporate tax on its worldwide profits, including the profits of the branches of Arch Re Europe and Arch Underwriters Europe. Any creditable foreign tax payable will be creditable against Arch Re Europe's Irish corporate tax liability on the results of Arch Re Europe's branches with the same principle applied to Arch Underwriters Europe's branches. The current rate of Irish corporation tax applicable to such trading profits is 12.5%.

Switzerland. Arch Re Europe Swiss Branch and Arch Underwriters Europe Swiss Branch are subject to Swiss corporation tax on the profit which is allocated to the branch. The effective tax rate is approximately 21.15% for Swiss federal, cantonal and communal corporation taxes on the profit. The effective tax rate of the annual cantonal and communal capital taxes on the equity which is allocated to Arch Re Europe Swiss Branch and Arch Underwriters Europe Swiss Branch is approximately 0.17%.

Denmark. Arch Re Denmark, established as a subsidiary of Arch Re Bermuda, is subject to Danish corporation taxes on its profits at a rate of 22% for 2016 and onwards.

Hong Kong. Arch MI Asia is subject to Hong Kong corporate tax on its assessable profits at a rate of 16.5%. Assessable profits are the net profits for the basis period, arising in or derived from Hong Kong.

Australia. Arch LMI, an Australian incorporated and tax resident company, is subject to Australian corporate tax on its worldwide profits. The current rate of Australian corporation tax applicable to such profits is 30%.

Taxation of Shareholders

Bermuda. Currently, there is no Bermuda withholding tax on dividends paid by us.

United States—General. The following summary sets forth certain U.S. federal income tax considerations related to the purchase, ownership and disposition of our common shares and our non-cumulative preferred shares ("preferred shares"). Unless otherwise stated, this summary deals only with shareholders ("U.S. holders") that are U.S. Persons (as defined below) who hold their common shares and preferred shares as capital assets and as beneficial owners. The following discussion is only a general summary of the U.S. federal income tax matters described herein and does not purport to address all of the U.S. federal income tax consequences that may be relevant to a particular shareholder in light of such shareholder's specific circumstances. In addition, the following summary does not describe the U.S. federal income tax consequences that may be relevant to certain types of shareholders, such as banks, insurance companies, regulated investment companies, real estate investment trusts, financial asset securitization investment trusts, dealers in securities or traders that adopt a mark-to-market method of tax accounting, tax exempt entities, expatriates, U.S. holders that hold our common shares or preferred shares through a non-U.S. broker or other non-U.S. intermediary, persons who hold the common shares or preferred shares as part of a hedging or conversion transaction or as part of a straddle, who may be subject to special rules or treatment under the Code or persons required for U.S. federal income tax purposed to recognize income no later than such income is reported on such persons' applicable financial statements. This discussion is based upon the Code, the Treasury regulations promulgated there under and any relevant administrative rulings or pronouncements or judicial decisions, all as in effect on the date of this annual report and as currently interpreted, and does not take into account possible changes in such tax laws or interpretations thereof, which may apply retroactively. This discussion does not include any description of the tax laws of any state or local governments within the U.S., or of any foreign government, that may be applicable to our common shares or preferred shares or the shareholders. Persons considering making an investment in the common shares or preferred shares should consult their own tax advisors concerning the application of the U.S. federal tax laws to their particular situations as well as any tax consequences arising under the laws of any state, local or foreign taxing jurisdiction prior to making such investment.

If an entity that is treated as a partnership holds our common shares or preferred shares, the tax treatment of a partner will generally depend upon the status of the partner and the activities of the partnership. If you are a partner of a partnership holding our common shares or preferred shares, you should consult your tax advisor.

For purposes of this discussion, the term "U.S. Person" means:

- an individual who is a citizen or resident of the U.S.;
- a corporation or entity treated as a corporation created or organized under the laws of the U.S., any state thereof, or the District of Columbia;
- an estate the income of which is subject to U.S. federal income taxation regardless of its source;
- a trust if either (i) a court within the U.S. is able to exercise primary supervision over the administration of such trust and one or more U.S. persons have the authority to control all substantial decisions of such trust or (ii) the trust has a valid election in effect to be treated as a U.S. person for U.S. federal income tax purposes; or
- any other person or entity that is treated for U.S. federal income tax purposes as if it were one of the foregoing.

United States—Taxation of Dividends. The preferred shares should be properly classified as equity rather than debt for U.S. federal income tax purposes. Subject to the discussions below relating to the potential application of the controlled foreign corporation ("CFC"), "related person insurance income" ("RPII") and passive foreign investment companies ("PFIC") rules, as defined below, cash distributions, if any, made with respect to our common shares or preferred shares will constitute dividends for U.S. federal income tax purposes to the extent paid out of our current or accumulated earnings and profits (as computed using U.S. tax principles). If a U.S. holder of our common shares or our preferred shares is an individual or other non-corporate holder, dividends paid, if any, to that holder that constitute qualified dividend income generally will be taxable at the rate applicable for long-term capital gains (generally up to 20%), provided that such person meets a holding period requirement. Generally in order to meet the holding period requirement, the U.S. Person must hold the common shares for more than 60 days during the 121-day period beginning 60 days before the ex-dividend date and must hold preferred shares for more than 90 days during the 181-day period beginning 90 days before the ex-dividend date. Dividends paid, if any, with respect to common shares or preferred shares generally will be qualified dividend income, provided the common shares or preferred shares are readily tradable on an established securities market in the U.S. in the year in which the shareholder receives the dividend (which should be the case for shares that are listed on the NASDAQ Stock Market or the New York Stock Exchange) and Arch Capital is not considered to be a passive foreign investment company in either the year of the distribution or the preceding taxable year. No assurance can be given that the preferred shares will be considered readily tradable on an established securities market in the U.S. See "—Taxation of Our U.S. Shareholders" below.

A U.S. holder that is an individual, estate or a trust that does not fall into a special class of trusts that is exempt from such tax, will be subject to a 3.8% tax on the lesser of (1) the U.S. holder's "net investment income" for the relevant taxable year and (2) the excess of the U.S. holder's modified adjusted gross income for the taxable year over a certain threshold (which in the case of individual will be between $125,000 and $250,000, depending on the individual's circumstances). A U.S. holder's net investment income will generally include its dividend income and its net gains from the disposition of our common shares and preferred shares, unless such dividend income or net gains are derived in the ordinary course of the conduct of a trade or business (other than a trade or business that consists of certain passive or trading activities).

Distributions with respect to the common shares and the preferred shares will not be eligible for the dividends received deduction allowed to U.S. corporations under the Code. To the extent distributions on our common shares and preferred shares exceed our earnings and profits, they will be treated first as a return of the U.S. holder's basis in our common shares and our preferred shares to the extent thereof, and then as gain from the sale of a capital asset.

United States—Sale, Exchange or Other Disposition. Subject to the discussions below relating to the potential application of the CFC, RPII and PFIC rules, holders of common shares and preferred shares generally will recognize capital gain or loss for U.S. federal income tax purposes on the sale, exchange or disposition of common shares or preferred shares, as applicable.

United States—Redemption of Preferred Shares. A redemption of the preferred shares will be treated under section 302 of the Code as a dividend if we have sufficient earnings and profits, unless the redemption satisfies one of the tests set forth in section 302(b) of the Code enabling the redemption to be treated as a sale or exchange, subject to the discussion herein relating to the potential application of the CFC, RPII and PFIC rules. Under the relevant Code section 302(b) tests, the redemption should be treated as a sale or exchange only if it (1) is substantially disproportionate, (2) constitutes a complete termination of the holder's stock interest in us or (3) is "not essentially equivalent to a dividend." In determining whether any of these tests are met, shares considered to be owned by the holder by reason of certain constructive ownership rules set forth in the Code, as well as shares actually owned, must generally be taken into account. It may be more difficult for a U.S. Person who owns, actually or constructively by operation of the attribution rules, any of our other shares to satisfy any of the above requirements. The determination as to whether any of the alternative tests of section 302(b) of the Code is satisfied with respect to a particular holder of the preference shares depends on the facts and circumstances as of the time the determination is made.

Taxation of Our U.S. Shareholders

Controlled Foreign Corporation Rules. We or any of our non-U.S. subsidiaries will be treated as a CFC with respect to any taxable year if at any time during such taxable year, one or more "10% Shareholders" (as defined below) collectively own more than 50% of us or such non-U.S. subsidiary (as applicable) by vote or value (taking into account shares actually owned by such U.S. holder as well as shares attributed to such U.S. holder under the Code or the regulations thereunder). For taxable years beginning on or before December 31, 2017, a 10% Shareholder means any shareholder who was considered to own, actually or constructively, 10% or more of the total combined voting power of our shares or those of our non-U.S. subsidiaries (as applicable). Under the Tax Cuts Act, for taxable years beginning after December 31, 2017, a 10% Shareholder also includes any shareholder who is considered to own, actually or constructively, 10% or more of the value of our shares or those of our non-U.S. subsidiaries (as applicable). As a result, for taxable years beginning after December 31, 2017, the voting cut-back limitation contained in our bye-laws that limits the votes conferred by the Controlled Shares (as defined in our bye-laws) of any U.S. Person to 9.9% of the total voting power of all our shares entitled to vote will not prevent any U.S. holder from being treated as a 10% Shareholder. Due to the repeal of section 958(b)(4) under the Tax Cuts Act, all non-U.S. subsidiaries directly or indirectly owned by Arch Capital are treated as constructively owned by its US subsidiaries, and therefore are treated as CFCs.

Status as a CFC would not cause us or any of our non-U.S. subsidiaries to be subject to U.S. federal income tax. Such status also would have no adverse U.S. federal income tax consequences for any U.S. holder that is not a 10% Shareholder with respect to us or any of such non-U.S. subsidiaries (as applicable). If we or any of our non-U.S. subsidiaries are or were a CFC with respect to any taxable year, a U.S. holder that is considered a 10% U.S. Shareholder would be subject to current U.S. federal income taxation (at ordinary income tax rates) to the extent of all or a portion of the undistributed earnings and profits of Arch Capital and our subsidiaries attributable to "subpart F income" (including certain insurance premium income and investment income) or global intangible low-taxed income and may be taxable at ordinary income tax rates on any gain recognized on a sale or other disposition (including by way of repurchase or liquidation) of our common shares or preferred shares to the extent of the current and accumulated earnings and profits attributable to such common shares or preferred shares. For taxable years beginning after December 31, 2017, a helpful limitation, which provides that a U.S. shareholder would not be subject to the current inclusion rules of Subpart F for a taxable year unless the non-U.S. corporation was a CFC for an uninterrupted period of 30 days or more during such taxable year, will no longer apply.

Related Person Insurance Income Rules. Generally, we do not expect the gross RPII of any of our non-U.S. subsidiaries to equal or exceed 20% of its gross insurance income in any taxable year for the foreseeable future (the "RPII 20% gross income exception"). Consequently, we do not expect any U.S. person owning common shares or preferred shares to be required to include in gross income for U.S. federal income tax purposes RPII income, but there can be no assurance that this will be the case.

Section 953(c)(7) of the Code generally provides that Section 1248 of the Code (which generally would require a U.S. holder to treat certain gains attributable to the sale, exchange or disposition of common shares or preferred shares as a dividend) will apply to the sale or exchange by a U.S. shareholder of shares in a foreign corporation that is characterized as a CFC under the RPII rules if the foreign corporation would be taxed as an insurance company if it were a domestic corporation, regardless of whether the U.S. shareholder is a 10% U.S. Shareholder or whether the corporation qualifies for the RPII 20% gross income exception. Although existing U.S. Treasury Department ("Treasury") regulations do not address the question, proposed Treasury regulations issued in April 1991 create some ambiguity as to whether Section 1248 and the requirement to file Form 5471 would apply when the foreign corporation has a foreign insurance subsidiary that is a CFC for RPII purposes and that would be taxed as an insurance company if it were a domestic corporation. We believe that Section 1248 and the requirement to file Form 5471 will not apply to a less than 10% U.S. Shareholder because Arch Capital is not directly engaged in the insurance business. There can be no assurance, however, that the IRS will interpret the proposed regulations in this manner or that the Treasury will not take the position that Section 1248 and the requirement to file Form 5471 will apply to dispositions of our common shares or our preferred shares.

If the IRS or Treasury were to make Section 1248 and the Form 5471 filing requirement applicable to the sale of our shares, we would notify shareholders that Section 1248 of the Code and the requirement to file Form 5471 will apply to dispositions of our shares. Thereafter, we would send a notice after the end of each calendar year to all persons who were shareholders during the year notifying them that Section 1248 and the requirement to file Form 5471 apply to dispositions of our shares by U.S. holders. We would attach to this notice a copy of Form 5471 completed with all our information and instructions for completing the shareholder information.

Tax-Exempt Shareholders. Tax-exempt entities may be required to treat certain Subpart F insurance income, including RPII, that is includible in income by the tax-exempt entity as unrelated business taxable income. Prospective investors that are tax exempt entities are urged to consult their own tax advisors as to the potential impact of the unrelated business taxable income provisions of the Code.

Passive Foreign Investment Companies. Sections 1291 through 1298 of the Code contain special rules applicable with respect to foreign corporations that are PFICs. In general, a foreign corporation will be a PFIC if 75% or more of its income constitutes "passive income" or 50% or more of its assets produce passive income. If we were to be characterized as a PFIC, U.S. holders would be subject to a penalty tax at the time of their sale of (or receipt of an "excess distribution" with respect to) their common shares or preferred shares. In general, a shareholder receives an "excess distribution" if the amount of the distribution is more than 125% of the average distribution with respect to the shares during the three preceding taxable years (or shorter period during which the taxpayer held the stock). In general, the penalty tax is equivalent to an interest charge on taxes that are deemed due during the period the shareholder owned the shares, computed by assuming that the excess distribution or gain (in the case of a sale) with respect to the shares was taxable in equal portions throughout the holder's period of ownership. The interest charge is equal to the applicable rate imposed on underpayments of U.S. federal income tax for such period. A U.S. shareholder may avoid some of the adverse tax consequences of owning shares in a PFIC by making a qualified electing fund ("QEF") election. A QEF election is revocable only with the consent of the IRS and has the following consequences to a shareholder:

- For any year in which Arch Capital is not a PFIC, no income tax consequences would result.
- For any year in which Arch Capital is a PFIC, the shareholder would include in its taxable income a proportionate share of the net ordinary income and net capital gains of Arch Capital and certain of its non-U.S. subsidiaries.

For taxable years beginning on or before December 31, 2017, the determination of whether the active insurance company exception applies to an insurance company was made on a case-by-case basis and the analysis was inherently subjective. Under the Tax Cuts Act, for taxable years beginning after December 31, 2017, the active insurance company exception applies only if (i) the company would be taxed as an insurance company were it a U.S. corporation and (ii) either (A) loss and loss adjustment expense and certain reserves constitute more than 25% of the company's gross assets for the relevant year or (B) loss and loss adjustment expenses and certain reserves constitute more than 10% of the company's gross assets for the relevant year and, based on the applicable facts and circumstances, the company is predominantly engaged in an insurance business and the failure of the company to satisfy the preceding 25% test is due solely to run-off related or other specified circumstances involving the insurance business. The PFIC statutory provisions contain a look-through rule that states that, for purposes of determining whether a foreign corporation is a PFIC, such foreign corporation shall be treated as if it "received directly its proportionate share of the income" and as if it "held its proportionate share of the assets" of any other corporation in which it owns at least 25% of the stock. We believe that we were not a PFIC for any taxable year beginning on or before December 31, 2017 and we are not expecting to become a PFIC for any taxable year beginning after December 31, 2017 and we will use reasonable best efforts to cause us and each of our majority owned non-U.S. insurance subsidiaries not to constitute a PFIC.

In July 2019, the IRS issued proposed regulations in an attempt to define the foreign insurance company exception to the PFIC rules (the "proposed PFIC insurance regulations"). No regulations interpreting the substantive PFIC provisions have yet been finalized. It is possible that the regulations interpreting the PFIC provisions will be issued in the future and contain rules different from those in the proposed PFIC insurance regulations. Each U.S. holder should consult its own tax advisor as to the effects of these rules.

United States Taxation of Non-U.S. Shareholders

Taxation of Dividends. Cash distributions, if any, made with respect to common shares or preferred shares held by shareholders who are not U.S. Persons ("Non-U.S. holders") generally will not be subject to U.S. withholding tax.

Sale, Exchange or Other Disposition. Non-U.S. holders of common shares or preferred shares generally will not be subject to U.S. federal income tax with respect to gain realized upon the sale, exchange or other disposition of such shares unless such gain is effectively connected with a U.S. trade or business of the Non-U.S. holder in the U.S. or such person is present in the U.S. for 183 days or more in the taxable year the gain is realized and certain other requirements are satisfied.

Information Reporting and Backup Withholding. Non-U.S. holders of common shares or preferred shares will not be subject to U.S. information reporting or backup withholding with respect to dispositions of common shares effected through a non-U.S. office of a broker, unless the broker has certain connections to the U.S. or is a U.S. person. No U.S. backup withholding will apply to payments of dividends, if any, on our common shares or our preferred shares.

FATCA Withholding. Sections 1471 through 1474 to the Code, known as the Foreign Account Tax Compliance Act ("FATCA"), impose a withholding tax of 30% on U.S.-source interest, dividends and certain other types of income, which is received by a foreign financial institution ("FFI"), unless such FFI enters into an agreement with the IRS to obtain certain information as to the identity of the direct and indirect owners of accounts in such institution. In addition, a 30% withholding tax may be imposed on the above payments to certain non-financial foreign entities which do not (i) certify to each respective withholding agent that they have no "substantial U.S. owners" (*i.e.*, a U.S. 10% direct or indirect shareholder), or (ii) provide such withholding agent with the certain information as to the identity of such substantial U.S. owners. The U.S. has entered into intergovernmental agreements to implement FATCA ("IGAs") with a number of jurisdictions. Bermuda has signed an IGA with the U.S. Different rules than those described above may apply under such an IGA.

Although dividends with respect to our common shares or preferred shares will generally be treated as foreign source for U.S. federal withholding tax purposes, it is unclear whether, for FATCA purposes, some or all of our dividends may be recharacterized as U.S. source dividends. Treasury regulations addressing this topic have not yet been issued.

Prospective investors are urged to consult their own tax advisors as to the filing and information requirements that may be imposed on them in respect of their ownership of our common share or preferred shares.

Other Tax Laws. Shareholders should consult their own tax advisors with respect to the applicability to them of the tax laws of other jurisdictions.

ITEM 1A. RISK FACTORS

Set forth below are risk factors relating to our business. These risks and uncertainties are not the only ones we face. There may be additional risks that we currently consider not to be material or of which we are not currently aware, and any of these risks could cause our actual results to differ materially from historical or anticipated results. You should carefully consider these risks along with the other information provided in this report, including our "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our accompanying consolidated financial statements, as well as the information under the heading "Cautionary Note Regarding Forward-Looking Statements" before investing in any of our securities. We may amend, supplement or add to the risk factors described below from time to time in future reports filed with the SEC.

Risks Relating to Our Industry

We operate in a highly competitive environment, and we may not be able to compete successfully in our industry.

The insurance and reinsurance industry is highly competitive. We compete on an international and regional basis with major U.S. and non-U.S. insurers and reinsurers, many of which have greater financial, marketing and management resources than we do. See "Competition" in Item 1 for details on our competitors in each of the major segments we operate in. There has been significant consolidation in the insurance and reinsurance sector in recent years and we may experience increased competition as a result of that consolidation, with consolidated entities having enhanced market power. These consolidated entities may use their enhanced market power and broader capital base to negotiate price reductions for products and services that compete with ours, and we may experience rate declines and possibly write less business. Any failure by us to effectively compete could adversely affect our financial condition and results of operations.

The insurance and reinsurance industry is highly cyclical, and we expect to continue to experience periods characterized by excess underwriting capacity and unfavorable premium rates.

Historically, insurers and reinsurers have experienced significant fluctuations in operating results due to competition, frequency of occurrence or severity of catastrophic events, levels of capacity, general economic conditions, changes in equity, debt and other investment markets, changes in legislation, case law and prevailing concepts of liability and other factors. In particular, demand for reinsurance is influenced significantly by the underwriting results of primary insurers and prevailing general economic conditions. The supply of insurance and reinsurance is related to prevailing prices and levels of surplus capacity that, in turn, may fluctuate in response to changes in rates of return being realized in the insurance and reinsurance industry on both underwriting and investment sides. As a result, the insurance and reinsurance business historically has been a cyclical industry characterized by periods of intense price competition due to excessive underwriting capacity as well as periods when shortages of capacity permitted favorable premium levels and changes in terms and conditions. The supply of insurance and reinsurance has increased over the past several years and may increase further, either as a result of capital provided by new entrants or by the commitment of additional capital by existing insurers or reinsurers. Continued increases in the supply of insurance and reinsurance may have consequences for us, including fewer contracts written, lower premium rates, increased expenses for customer acquisition and retention, and less favorable policy terms and conditions.

Claims for catastrophic events could cause large losses and substantial volatility in our results of operations and could have a material adverse effect on our financial position and results of operations.

We have large aggregate exposures to natural and man-made catastrophic events. Catastrophes can be caused by various events, including hurricanes, floods, tsunamis, windstorms, earthquakes, hailstorms, tornadoes, explosions, severe winter weather, fires, droughts and other natural disasters. The frequency and severity of natural catastrophe activity, including hurricanes, tsunamis, tornadoes, floods and droughts, has also been greater in recent years. Catastrophes can also cause losses in non-property business such as workers' compensation or general liability. In addition to the nature of the 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. Actual losses from future catastrophic events may vary materially from estimates due to the inherent uncertainties in making such determinations resulting from several factors, including the potential inaccuracies and inadequacies in the data provided by clients, brokers and ceding companies, the modeling techniques and the application of such techniques, the contingent nature of business interruption exposures, the effects of any resultant demand surge on claims activity and attendant coverage issues.

In addition, over the past several years, changing weather patterns and climatic conditions, such as global warming, have added to the unpredictability and frequency of natural disasters in certain parts of the world and created additional uncertainty as to future trends and exposures. Although the loss experience of catastrophe insurers and reinsurers has historically been characterized as low frequency, there is a growing consensus today that climate change increases the frequency and severity of extreme weather events and, in recent years, the frequency of major catastrophes appears to have increased, and may continue to increase in the future.

Claims for catastrophic events, or an unusual frequency of smaller losses in a particular period, could expose us to large losses, cause substantial volatility in our results of operations and could have a material adverse effect on our ability to write new business if we are not able to adequately assess and reserve for the increased frequency and severity of catastrophes resulting from these environmental factors. Additionally, catastrophic events could result in increased credit exposure to reinsurers and other counterparties we transact business with, declines in the value of investments we hold and significant disruptions to our physical infrastructure, systems and operations.

Additionally, we cannot predict how legal, regulatory and/or social responses to concerns around global climate change may impact our business. We attempt to manage our exposure to such events through the use of underwriting controls, risk models, and the purchase of third-party reinsurance. Underwriting controls can include more restrictive underwriting criteria such as higher premiums and deductibles, or losses retained, and more specifically excluded policy risks. Our deductible in connection with a catastrophic event is determined by market capacity, pricing conditions and surplus preservation. There can be no assurance that our reinsurance coverage and other measures taken will be sufficient to mitigate losses resulting from one or more catastrophic events. As a result, the occurrence of one or more catastrophic events and the continuation and worsening of recent trends could have an adverse effect on our results of operations and financial condition.

Environmental, Social and Governance (ESG) and sustainability have become major topics that encompass a wide range of issues, such as climate change and other environmental risks. It is something that has come to the fore at a European level. For example, the European Commission has published non-binding guidelines on non-financial reporting (to include climate-change related information). It may well be that mandatory, rather than voluntary, disclosure requirements will be introduced in due course which could have an impact on the operation model of Arch Capital.

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.

We have substantial exposure to unexpected, large losses resulting from future man-made catastrophic events, such as acts of war, acts of terrorism and political instability. These risks are inherently unpredictable. It is difficult to predict the timing of such events with statistical certainty or estimate the amount of loss any given occurrence will generate. In certain instances, we specifically insure and reinsure risks resulting from acts of terrorism. We may also insure against risk related to cybersecurity and cyber-attacks. In addition, our exposure to cyber-attacks includes exposure to 'silent cyber' risks, meaning risks and potential losses associated with policies where cyber risk is not specifically included nor excluded in the policies. Even in cases where we attempt to exclude losses from terrorism, cybersecurity and certain other similar risks from some coverages written by us, we may not be successful in doing so. Moreover, irrespective of the clarity and inclusiveness of policy language, there can be no assurance that a court or arbitration panel will not limit enforceability of policy language or otherwise issue a ruling adverse to us. Accordingly, while we believe our reinsurance programs, together with the coverage provided under the Terrorism Risk Insurance Act of

2002, as amended are sufficient to reasonably limit our net losses relating to potential future terrorist attacks, we can offer no assurance that our available capital will be adequate to cover losses when they materialize. To the extent that an act of terrorism is certified by the Secretary of the Treasury and aggregate industry insured losses resulting from the act of terrorism exceeds the prescribed program trigger, our U.S. insurance operations may be covered under TRIP for up to 80% subject to a mandatory deductible of 20% of our prior year's direct earned premium for covered property and liability coverages. The program trigger for calendar year 2020 is $200 million. If an act (or acts) of terrorism result in covered losses exceeding the $100 billion annual limit, insurers with losses exceeding their deductibles will not be responsible for additional losses. It is not possible to completely eliminate our exposure to unforecasted or unpredictable events, and to the extent that losses from such risks occur, our financial condition and results of operations could be materially adversely affected.

Our operations are also exposed to the risk of catastrophic mortality, such as a pandemic or other event that causes a large number of deaths. For example, on January 30, 2020, the World Health Organization declared that the recent coronavirus disease 2019 ("COVID-19") outbreak which emanated from China was a global health emergency. This has resulted in increased travel restrictions and extended shutdown of certain businesses not just in China but in other parts of Asia as well. With a recent rise in the number of cases of the coronovirus outside of China, travel restrictions and other disruption to businesses globally have also increased. While the effects of the coronavirus will be difficult to assess or predict, an outbreak could have a significant impact on our business. A significant pandemic could have a major impact on the global economy or the economies of particular countries or regions, including travel, trade, tourism, the health system, food supply, consumption, overall economic output, as well as on the financial markets. In addition, a pandemic that affected our employees or the employees of our distributors or of other companies with which we do business could disrupt our business operations. The effectiveness of external parties, including governmental and non-governmental organizations, in combating the spread and severity of such a pandemic could have a material impact on the losses we experience. These events could cause a material adverse effect on our results of operations in any period and, depending on their severity, could also materially and adversely affect our financial condition.

Political, regulatory, legislative and industry initiatives could adversely affect our business.

Governmental authorities in the U.S. and worldwide have become increasingly interested in potential risks posed by the insurance industry as a whole, and to commercial and financial systems in general and there may be increased regulatory intervention in our industry in the future. For example, in the U.S., the federal government (including federal consumer protection authorities) has increased its scrutiny of the insurance regulatory framework in recent years, and various state legislators are considering or have enacted laws that will alter and likely increase state regulation of insurance and reinsurance companies and holding companies. The U.S. mortgage insurance industry has also been subject to increased federal and state regulatory scrutiny (including by state insurance regulatory authorities), which could generate new regulations, regulatory actions or investigations.

In the EU, Solvency II imposed economic risk-based solvency requirements across all EU Member States covering quantitative capital requirements, qualitative regulatory reviews and market discipline. In addition, Solvency II imposes significant requirements for our EU-based regulated companies which require substantial documentation and implementation effort. Following the U.K.'s departure from the EU, it is uncertain whether the U.K. will maintain equivalence with Solvency II beyond the end of the Transition Period.

The BMA has also implemented and imposed additional requirements on the commercial insurance companies it regulates, driven, in large part, by Solvency II. The European Commission has adopted a decision concluding that Bermuda meets the full equivalence criteria under Solvency II.

While we cannot predict the exact nature, timing or scope of any possible governmental initiatives, such proposals could adversely affect our business by, among other things: providing reinsurance capacity in markets and to consumers that we target; requiring our further participation in industry pools and guaranty associations; expanding the scope of coverage under existing policies (*e.g.*, following large disasters); further regulating the terms of insurance or reinsurance contracts; or disproportionately benefiting the companies of one country over those of another.

In addition, increased scrutiny by insurance regulators of investments in or acquisitions of insurers or insurance holding companies by private equity firms or hedge funds may result in imposition of additional regulatory requirements and restrictions. We have in the past partnered with private equity firms in making investments and may do so in the future. This increased scrutiny may make it difficult to complete investments with private equity or hedge funds should we seek to do so.

Underwriting risks and reserving for losses are based on probabilities and related modeling, which are subject to inherent uncertainties.

Our success is dependent upon our ability to assess accurately the risks associated with the businesses that we insure and reinsure. We establish reserves for losses and loss adjustment expenses 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. 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. Most or all of these factors are not directly quantifiable, particularly on a prospective basis, and the effects of these and unforeseen factors could negatively impact our ability to accurately assess the risks of the policies that we write. Changes in the assumptions used by these models or by management could lead to an increase in our estimate of ultimate losses in the future. In addition, there may be significant reporting lags between the occurrence of the insured event and the time it is actually reported to the insurer and additional lags between the time of reporting and final settlement of claims. Unfavorable development in any of these factors could cause the level of reserves to be inadequate. In addition, the estimation of loss reserves is also more difficult during times of adverse economic and market conditions due to unexpected changes in behavior of claimants and policyholders, including an increase in fraudulent reporting of exposures and/or losses, reduced maintenance of insured properties or increased frequency of small claims. Changes in the level of inflation also result in an increased level of uncertainty in our estimation of loss reserves. As a result, actual losses and loss adjustment expenses paid will deviate, perhaps substantially, from the reserve estimates reflected in our financial statements.

If our loss reserves are determined to be inadequate, we will be required to increase loss reserves at the time of such determination with a corresponding reduction in our net income in the period in which the deficiency becomes known. It is possible that claims in respect of events that have occurred could exceed our claim reserves and have a material adverse effect on our results of operations, in a particular period, or our financial condition in general. As a compounding factor, although most insurance contracts have policy limits, the nature of property and casualty insurance and reinsurance is such that losses can exceed policy limits for a variety of reasons and could significantly exceed the premiums received on the underlying policies, thereby further adversely affecting our financial condition.

In accordance with mortgage insurance industry practice, we establish loss reserves only for loans in our existing delinquency inventory. Because our mortgage insurance reserving process does not take account of the impact of future losses from loans that are not delinquent, mortgage insurance loss reserves are not intended to be an estimate of total future losses. Our expectation of total future losses under our mortgage insurance policies in force at any period end is not reflected in our financial statements. In addition to establishing loss reserves for delinquent loans, under GAAP, we are required to establish a premium deficiency reserve for our mortgage insurance products if the amount of expected future losses for a particular product and maintenance costs for such product exceeds expected future premiums, existing reserves and the anticipated investment income. We evaluate whether a premium deficiency exists quarterly. There can be no assurance that premium deficiency reserves will not be required in future periods. If this were to occur, our results of operations and financial condition could be adversely affected.

As of December 31, 2019, our consolidated reserves for unpaid losses and loss adjustment expenses, net of unpaid losses and loss adjustment expenses recoverable, were approximately $9.81 billion. Such reserves were established in accordance with applicable insurance laws and GAAP. Loss reserves are inherently subject to uncertainty. In establishing the reserves for losses and loss adjustment expenses, we have made various assumptions relating to the pricing of our reinsurance contracts and insurance policies and have also considered available historical industry experience and current industry conditions. Any estimates and assumptions made as part of the reserving process could prove to be inaccurate due to several factors, including the fact that relatively limited historical information has been reported to us through December 31, 2019.

The failure of any of the loss limitation methods we employ could have a material adverse effect on our financial condition or results of operations.

We seek to limit our loss exposure by writing a number of our reinsurance contracts on an excess of loss basis, adhering to maximum limitations on reinsurance written in defined geographical zones, limiting program size for each client and prudent underwriting of each program written. In the case of proportional treaties, we may seek per occurrence limitations or loss ratio caps to limit the impact of losses from any one or series of events. In our insurance operations, we seek to limit our exposure through the purchase of reinsurance. For our U.S. mortgage insurance business, in addition to utilizing reinsurance, we have developed a proprietary risk model that simulates the maximum loss resulting from a severe economic event impacting the housing market. We cannot be certain that any of these loss limitation methods will be effective. We also seek to limit our loss exposure by geographic diversification. Geographic zone limitations involve significant underwriting judgments, including the determination of the area of the zones and the inclusion of a particular policy within a particular zone's limits. Various provisions of our policies, negotiated to limit our risk, such as limitations or exclusions from coverage or choice of forum, may not be enforceable in the manner we intend, as it is possible that a court or regulatory authority could nullify or void an exclusion or limitation, or legislation could be enacted modifying or barring the use of these exclusions and limitations. Disputes relating to coverage and choice of legal forum may also arise. Underwriting is inherently a matter of judgment, involving important assumptions about matters that are inherently unpredictable and beyond our control, and for which historical experience and probability analysis may not provide sufficient guidance. No assurances can be made that these loss limitation methods will be effective and mitigate our loss exposure. One or more catastrophic events or severe economic events could result in claims that substantially exceed our expectations, or the protections set forth in our policies could be voided, which, in either case, could have a material adverse effect on our financial condition or our results of operations, possibly to the extent of eliminating our shareholders' equity. In addition, factors such as global climate change limit the value of historical experience and therefore further limit the effectiveness of our loss limitation methods. See "Catastrophic Events and Severe Economic Events" in Item 7 for further details. Depending on business opportunities and the mix of business that may comprise our insurance, reinsurance and mortgage insurance portfolio, we may seek to adjust our self-imposed limitations on probable maximum pre-tax loss for catastrophe exposed business and mortgage default exposed business.

Adverse developments in the financial markets could have a material adverse effect on our results of operations, financial position and our businesses, and may also limit our access to capital; our policyholders, reinsurers and retrocessionaires may also be affected by such developments, which could adversely affect their ability to meet their obligations to us.

Adverse developments in the financial markets, such as disruptions, uncertainty or volatility in the capital and credit markets, may result in realized and unrealized capital losses that could have a material adverse effect on our results of operations, financial position and our businesses, and may also limit our access to capital required to operate our business. Depending on market conditions, we could incur additional realized and unrealized losses on our investment portfolio in future periods, which could have a material adverse effect on our results of operations, financial condition and business. Economic conditions could also have a material impact on the frequency and severity of claims and therefore could negatively impact our underwriting returns. In addition, our policyholders, reinsurers and retrocessionaires may be affected by developments in the financial markets, which could adversely affect their ability to meet their obligations to us. The volatility in the financial markets could continue to significantly affect our investment returns, reported results and shareholders' equity.

The U.K.'s Withdrawal from the EU could adversely affect us.

In a referendum in June 2016, a majority of voting U.K. citizens voted in favor of Brexit, whereby the U.K. will leave the EU. The U.K. government invoked Article 50 of the Treaty on European Union ("Article 50") in 2017. On January 31, 2020, the U.K. withdrew from the EU. Terms of this withdrawal are set forth in the Withdrawal Agreement, which was approved by the U.K. Parliament and the EU Parliament. The Withdrawal Agreement allows for a Transition Period whereby "passporting" rights will continue to exist until the end of the Transition Period, which is December 31, 2020 (unless a single extension of one to two years to this Transition Period is agreed between the U.K. government and the EU, by June 30, 2020, although the U.K. government has indicated that no extension will be sought). During the Transition Period, the U.K. government and the EU will endeavor to negotiate a trade deal to govern the future relationship between the U.K. and the EU. If a trade deal is not agreed by the end of the Transition Period (and no extension to the Transition Period is agreed between the U.K. and the EU), the U.K. will leave the EU on December 31, 2020 on World Trade Organization ("WTO") terms, meaning that most U.K. goods will be subject to tariffs until a free trade deal is brought in and "passporting" rights will cease to apply.

Accordingly, there remains considerable uncertainty as to the negotiations between the U.K. and the EU during the Transition Period and the ultimate structure of the U.K's future relationship with the EU. There is no certainty that the U.K.'s solvency and prudential regime will be deemed "equivalent" to Solvency II or that the U.K. will not impose more stringent requirements on companies conducting insurance business in the U.K.

During this Transition Period and beyond, the impact of the U.K.'s withdrawal on the U.K. and European economies and the broader global economy could be significant, resulting in negative consequences, such as increased volatility and illiquidity, and potentially lower economic growth in various markets in the U.K., Europe and globally and could continue to contribute to instability in global financial and foreign exchange markets. Brexit could also have the effect of disrupting the free movement of goods, services and people between the U.K. and the EU. We anticipate that Brexit may disrupt our U.K. domiciled entities, including our Lloyd's syndicates, and their ability to "passport" within the EU. Similarly, Brexit may disrupt the ability of our EU domiciled entities to access the U.K. markets although the U.K is attempting to mitigate this by introducing a temporary permissions regime which allows firms that wish to continue carrying out regulated activities in the U.K. in the longer term to operate in the U.K for a limited period after withdrawal, while they seek authorization from the U.K. regulators. The full effects of Brexit are uncertain and will depend on any agreements the U.K. and EU enter into regarding their future relationship.

The negative impact of these events on economic conditions and global markets could have an adverse effect on our business, financial condition and liquidity. For example, this crisis may cause the value of the European currencies, including the Euro and the British Pound Sterling, to further depreciate against the U.S. Dollar, which in turn could materially adversely impact assets denominated in such currencies held in our investment portfolio or results of our European book of business. In addition, the applicable legal framework and the terms of our Euro-denominated insurance policies and reinsurance agreements generally do not address withdrawal by a member state from the Eurozone or a break-up of the EU, which could create uncertainty in our payment obligations and rights under those policies and agreements in the event that such a withdrawal or break-up does occur.

Additionally, a contagion effect of a possible default of one or more EU Member States and/or their withdrawal from the Eurozone, or the failure of financial institutions, on the global economy, including other EU Member States and our counterparties located in those countries, or a break-up of the EU could have a material adverse effect on our business, financial condition, results of operations and liquidity. As a result of Brexit, other European countries may seek to conduct referenda with respect to their continuing membership with the EU. Given these possibilities and others we may not anticipate, as well as the lack of comparable precedent, the full extent to which our business, results of operations and financial condition could be adversely affected by Brexit is uncertain.

The risk associated with underwriting treaty reinsurance business could adversely affect us.

Like other reinsurers, our reinsurance group does not separately evaluate each of the individual risks assumed under reinsurance treaties. Therefore, we are largely dependent on the original underwriting decisions made by ceding companies. We are subject to the risk that the ceding companies may not have adequately evaluated the risks to be reinsured and that the premiums ceded may not adequately compensate us for the risks we assume.

The availability of reinsurance, retrocessional coverage and capital market transactions to limit our exposure to risks may be limited, and counterparty credit and other risks associated with our reinsurance arrangements may result in losses which could adversely affect our financial condition and results of operations.

For the purposes of managing risk, we use reinsurance, retrocessional coverage and capital markets transactions. In the normal course of business, our insurance subsidiaries cede a portion of their premiums through pro rata, excess of loss and facultative reinsurance agreements. Our reinsurance subsidiaries purchase a limited amount of retrocessional coverage as part of their aggregate risk management program. In addition, our reinsurance subsidiaries participate in "common account" retrocessional arrangements for certain pro rata treaties. Such arrangements reduce the effect of individual or aggregate losses to all companies participating on such treaties, including the reinsurers, such as our reinsurance subsidiaries, and the ceding company. Economic conditions could also have a material impact on our ability to manage our risk aggregations through reinsurance or capital markets transactions. The availability and cost of reinsurance and retrocessional protection is subject to market conditions, which are beyond our control. As a result of such market conditions and other factors, we may not be able to successfully mitigate risk through reinsurance and retrocessional arrangements.

Further, we are subject to credit risk with respect to our reinsurance and retrocessions because the ceding of risk to reinsurers and retrocessionaires does not relieve us of our liability to the clients or companies we insure or reinsure. We monitor the financial condition of our reinsurers and attempt to place coverages only with carriers we view as substantial and financially sound. Although we have not experienced any material credit losses to date, an inability of our reinsurers or retrocessionaires to meet their obligations to us could have a material adverse effect on our financial condition and results of operations. Our losses for a given event or occurrence may increase if our reinsurers or retrocessionaires dispute or fail to meet their obligations to us or the reinsurance or retrocessional protections purchased by us are exhausted or are otherwise unavailable for any reason. Our failure to establish adequate reinsurance or retrocessional arrangements or the failure of our existing reinsurance or retrocessional arrangements to protect us from overly concentrated risk exposure could adversely affect our financial condition and results of operations.

Our reliance on brokers subjects us to their credit risk.

In accordance with industry practice, we generally pay amounts owed on claims under our insurance and reinsurance contracts to brokers, and these brokers, in turn, pay these amounts to the clients that have purchased insurance or reinsurance from us. In some jurisdictions, if a broker fails to make such payment, we may remain liable to the insured or ceding insurer for the deficiency. Likewise, in certain jurisdictions, when the insured or ceding company pays the premiums for these contracts to brokers for payment to us, these premiums are considered to have been paid and the insured or ceding company will no longer be liable to us for those amounts, whether or not we have actually received the premiums from the broker. Consequently, we assume a degree of credit risk associated with our brokers. To date, we have not experienced any losses related to this credit risk.

Emerging claim and coverage issues may adversely affect our business.

As industry practices and legal, judicial, social and other environmental conditions change, unexpected and unintended issues related to claims and coverage may emerge, including new or expanded theories of liability. These or other changes could impose new financial obligations on us by extending coverage beyond our underwriting intent or otherwise require us to make unplanned modifications to the products and services that we provide, or cause the delay or cancellation of products and services that we provide. In some instances, these changes may not become apparent until sometime after we have issued insurance or reinsurance contracts that are affected by the changes. As a result, the full extent of liability under our insurance or reinsurance contracts may not be known for many years after a contract is issued. The effects of unforeseen developments or substantial government intervention could adversely impact our ability to achieve our goals.

Changes in current accounting principles and practices and financial reporting requirements may materially affect our reported financial results and our reported financial condition.

Our financial statements are prepared in accordance with GAAP, which is periodically revised by the Financial Accounting Standards Board ("FASB"), and they are subject to the accounting-related rules and interpretations of the SEC. We are required to adopt new and revised accounting standards implemented by the FASB. Unanticipated developments in accounting practices may require us to incur considerable additional expenses to comply with such developments, particularly if we are required to prepare information relating to prior periods for comparative purposes or to apply the new requirements retroactively. The impact of changes in accounting principles, practices and standards, particularly those that apply to insurance companies, cannot be predicted but may affect the calculation of net earnings, shareholders' equity and other relevant financial statement line items. In addition, such changes may cause additional volatility in reported earnings, decrease the understandability of our financial results and affect the comparability of our reported results with the results of others.

Risks Relating to Our Company

Acquisitions, the addition of new lines of insurance or reinsurance business, expansion into new geographic regions and/or entering into joint ventures or partnerships expose us to risks.

We may seek, from time to time, to acquire other companies, acquire selected blocks of business, expand our business lines, expand into new geographic regions and/or enter into joint ventures or partnerships. Such activities expose us to challenges and risks, including: integrating financial and operational reporting systems; establishing satisfactory budgetary and other financial controls; funding increased capital needs, overhead expenses or cash flow shortages that may occur if anticipated sales and revenues are not realized or are delayed, whether by general economic or market conditions or unforeseen internal difficulties; obtaining management personnel required for expanded operations; obtaining necessary regulatory permissions; and establishing adequate reserves for any acquired book of business. In addition, the value of assets acquired may be lower than expected or may diminish due to credit defaults or changes in interest rates; the liabilities assumed may be greater than expected; and assets and liabilities acquired may be subject to foreign currency exchange rate fluctuation. We may also be subject to financial exposures in the event that the sellers of the entities or business we acquire are unable or unwilling to meet their indemnification, reinsurance and other contractual obligations to us. Our failure to manage successfully any of the foregoing challenges and risks may adversely impact our results of operations.

The ultimate performance of the Arch MI U.S. mortgage insurance portfolio remains uncertain.

Arch MI U.S. had risk in force of approximately $73.4 billion, before external reinsurance, as of December 31, 2019, including $3.9 billion of risk in force originated in 2009 and prior. The presence of multiple higher-risk characteristics in a loan materially increases the likelihood of a claim on such a loan unless there are other characteristics to mitigate the risk. The mix of business in our insured loan portfolio may affect losses and remain uncertain.

The frequency and severity of claims we incur will be uncertain and will depend largely on general economic factors outside of our control, including, among others, changes in unemployment, home prices and interest rates in the U.S. Deteriorating economic conditions in the U.S. could adversely affect the performance of our acquired U.S. mortgage insurance portfolio and could adversely affect our results of operations and financial condition.

Generally, we cannot cancel mortgage insurance coverage or adjust renewal premiums during the life of a mortgage insurance policy. As a result, higher than anticipated claims generally cannot be offset by premium increases on policies in force or mitigated by our non-renewal or cancellation of insurance coverage. In addition, the premium rate for loans that refinanced in 2019 may be lower than premium rates charges on the original purchase in prior years. The premiums charged on the acquired UGC insured loan portfolio, and the associated investment income, may not be adequate to compensate us for the risks and costs associated with the insurance coverage provided to customers.

A downgrade in our ratings or our inability to obtain a rating for our operating insurance and reinsurance subsidiaries may adversely affect our relationships with clients and brokers and negatively impact sales of our products.

A ratings downgrade or the potential for such a downgrade, or failure to obtain a necessary rating, could adversely affect our relationships with agents, brokers, wholesalers, intermediaries, clients and other distributors of our existing products and services, as well as new sales of our products and services. In addition, under certain of the reinsurance agreements assumed by our reinsurance operations, upon the occurrence of a ratings downgrade or other specified triggering event with respect to our reinsurance operations, such as a reduction in surplus by specified amounts during specified periods, our ceding company clients may be provided with certain rights, including, among other things, the right to terminate the subject reinsurance agreement and/or to require that our reinsurance operations post additional collateral. Any ratings downgrade or failure to obtain a necessary rating could adversely affect our ability to compete in our markets, could cause our premiums and earnings to decrease and could have a material adverse impact on our financial condition and results of operations. In addition, a downgrade in ratings of certain of our operating subsidiaries would in certain cases constitute an event of default under our credit facilities. For further information on our financial strength and/or issuer ratings, see "Ratings" in Item 1. For further information on our letter of credit facilities, see the Letter of Credit and Revolving Credit Facilities section of "Contractual Obligations and Commercial Commitments" in Item 7.

We can offer no assurances that our ratings will remain at their current levels or that any of our ratings which are under review or watch by ratings agencies will remain unchanged. We believe it is possible that rating agencies may heighten the level of scrutiny they apply when analyzing companies in our industry, may increase the frequency and scope of their reviews, may request additional information from the companies that they rate (including additional information regarding the valuation of investment securities held), and may adjust upward the capital and other requirements employed in their models for maintenance of certain rating levels.

Our success will depend on our ability to maintain and enhance effective operating procedures and internal controls and our enterprise risk management ("ERM") program.

Operational risk and losses can result from, among other things, fraud, errors, failure to document transactions properly or to obtain proper internal authorization, failure to comply with regulatory requirements, information technology failures, failure to appropriately transition new hires or external events. We continue to enhance our operating procedures and internal controls (including information technology initiatives and controls over financial reporting) 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 our goals are met. Any ineffectiveness in our controls or procedures could have a material adverse effect on our business.

We operate within an ERM framework designed to assess and monitor our risks. However, there can be no assurance that we can effectively review and monitor all risks or that all of our employees will operate within the ERM framework. There can be no assurance that our ERM framework will result in us accurately identifying all risks and accurately limiting our exposures based on our assessments. For further information on our ERM framework, see "Enterprise Risk Management" in Item 1.

Our business is dependent upon insurance and reinsurance brokers and intermediaries, and the loss of important broker relationships could materially adversely affect our ability to market our products and services.

We market our insurance and reinsurance products primarily through brokers and intermediaries. We derive a significant portion of our business from a limited number of brokers. During 2019, approximately 12.2% and 9.6% of our gross premiums written were generated from or placed by Aon Corporation and its subsidiaries and Marsh & McLennan Companies and its subsidiaries, respectively. No other broker and no one insured or reinsured accounted for more than 10% of gross premiums written for 2019. Some of our competitors have higher financial strength ratings, offer a larger variety of products, set lower prices for insurance coverage, offer higher commissions and/or have had longer term relationships with the brokers we use than we have. This may adversely impact our ability to attract and retain brokers to sell our insurance products or brokers may increasingly promote products offered by other companies. The failure or inability of brokers to market our insurance products successfully, or loss of all or a substantial portion of the business provided by these brokers could have a material adverse impact on our business, financial condition and results of operations.

We could be materially adversely affected to the extent that managing general agents, general agents and other producers exceed their underwriting authorities or if our agents, our insureds or other third parties commit fraud or otherwise breach obligations owed to us.

For certain business conducted by our insurance group, following our underwriting, financial, claims and information technology due diligence reviews, we authorize managing general agents, general agents and other producers to write business on our behalf within underwriting authorities prescribed by us. In addition, our mortgage group delegates the underwriting of a significant percentage of its primary new insurance written to certain mortgage lenders. Under this delegated underwriting program, the approved customer may determine whether mortgage loans meet our mortgage insurance program guidelines and commit us to issue mortgage insurance. We rely on the underwriting controls of these agents to write business within the underwriting authorities provided by us. Although we have contractual protections in some instances and we monitor such business on an ongoing basis, our monitoring efforts may not be adequate or our agents may exceed their underwriting authorities or otherwise breach obligations owed to us. In addition, our agents, our insureds or other third parties may commit fraud or otherwise breach their obligations to us. To the extent that our agents, our insureds or other third parties exceed their underwriting authorities, commit fraud or otherwise breach obligations owed to us in the future, our financial condition and results of operations could be materially adversely affected.

We are exposed to credit risk in certain of our business operations.

In addition to exposure to credit risk related to our investment portfolio, reinsurance recoverables and reliance on brokers and other agents (each discussed elsewhere in this section), we are exposed to credit risk in other areas of our business related to policyholders. We are exposed to credit risk in our insurance group's surety unit where we guarantee to a third party that our policyholder will satisfy certain performance or financial obligations. If our policyholder defaults, we may suffer losses and be unable to be reimbursed by our policyholder. We are exposed to credit risk in our insurance group's construction and national accounts units where we write large deductible insurance policies. Under these policies, we are typically obligated to pay the claimant the full amount of the claim (shown as "contractholder payables" on our consolidated balance sheets). We are subsequently reimbursed by the policyholder for the deductible amount (shown as "contractholder receivables" on our consolidated balance sheets), which can be a set amount per claim and/or an aggregate amount for all covered claims. As such, we are exposed to credit risk from the policyholder. We are also exposed to credit risk from policyholders on smaller deductibles in other insurance group lines, such as healthcare and excess and surplus casualty. Additionally, we write retrospectively rated policies (*i.e.*, policies in which premiums are adjusted after the policy period based on the actual loss experience of the policyholder during the policy period). In this instance, we are exposed to credit risk to the extent the adjusted premium is greater than the original premium. While we generally seek to mitigate this risk through collateral agreements that require the posting of collateral in such forms as cash and letters of credit from banks, our efforts to mitigate the credit risk that we have to our policyholders may not be successful. Although we have not experienced any material credit losses to date, an increased inability of our policyholders to meet their obligations to us could have a material adverse effect on our financial condition and results of operations.

Our investment performance may affect our financial results and ability to conduct business.

Our operating results depend in part on the performance of our investment portfolio. A significant portion of cash and invested assets held by Arch consists of fixed maturities (75.8% as of December 31, 2019). Although our current investment guidelines and approach stress preservation of capital, market liquidity and diversification of risk, our investments are subject to market-wide risks and fluctuations. In addition, we are subject to risks inherent in particular securities or types of securities, as well as sector concentrations. Changing market conditions could materially affect the future valuation of securities in our investment portfolio, which could cause us to impair some portion of those securities. We may not be able to realize our investment objectives, which could have a material adverse effect on our financial results. In the event that we are unsuccessful in correlating our investment portfolio with our expected insurance and reinsurance liabilities, we may be forced to liquidate our investments at times and prices that are not optimal, which could have a material adverse effect on our financial results and ability to conduct our business.

Foreign currency exchange rate fluctuation may adversely affect our financial results.

We write business on a worldwide basis, and our results of operations may be affected by fluctuations in the value of currencies other than the U.S. Dollar. The primary foreign currencies in which we operate are the Euro, the British Pound Sterling, the Australian Dollar and the Canadian Dollar. Changes in foreign currency exchange rates can reduce our revenues, increase our liabilities and costs and cause fluctuations in the valuation of our investment portfolio. We may therefore suffer losses solely as a result of exchange rate fluctuations. In order to mitigate our exposure to foreign currency fluctuations in our net insurance liabilities, we have invested and expect to continue to invest in securities denominated in currencies other than the U.S. Dollar. In addition, we may replicate investment positions in foreign currencies using derivative financial instruments. Changes in the value of investments due to foreign currency rate movements are reflected as a direct increase or decrease to shareholders' equity and are not included in the statement of income. We have chosen not to hedge certain currency risks on capital contributed to certain subsidiaries, and may continue to choose not to hedge our currency risks. There can be no assurances that arrangements to match projected liabilities in foreign currencies with investments in the same currencies or derivative financial instruments will mitigate the negative impact of exchange rate fluctuations, and we may suffer losses solely as a result of exchange rate fluctuations.

We may be adversely affected by changes in economic conditions, including interest rate changes.

Our operating results are affected by, and we are exposed to, significant financial and capital markets risk, including changes in interest rates, real estate values, foreign currency exchange rates, market volatility, the performance of the economy in general, the performance of our investment portfolio and other factors outside our control. Interest rates are highly sensitive to many factors, including the fiscal and monetary policies of the U.S. and other major economies, inflation, economic and political conditions and other factors beyond our control. Although we attempt to take measures to manage the risks of investing in changing interest rate environments, we may not be able to mitigate interest rate sensitivity effectively. Despite our mitigation efforts, an increase in interest rates could have a material adverse effect on our book value.

Our investment portfolio includes residential mortgage backed securities ("RMBS"). As of December 31, 2019, RMBS constituted approximately 2.4% of cash and invested assets held by Arch. As with other fixed income investments, the fair value of these securities fluctuates depending on market and other general economic conditions and interest rate trends. In periods of declining interest rates, mortgage prepayments generally increase and RMBS are prepaid more quickly, requiring us to reinvest the proceeds at the then current market rates. Conversely, in periods of rising rates, mortgage prepayments generally fall, preventing us from taking full advantage of the higher level of rates. The residential mortgage market in the U.S has experienced a variety of difficulties in certain underwriting periods. A decline or an extended flattening in residential property values may result in additional increases in delinquencies and losses on residential mortgage loans generally, especially with respect to any residential mortgage loans where the aggregate loan amounts (including any subordinate loans) are close to or greater than the related property values. These developments may have a significant adverse effect on the prices of loans and securities, including those in our investment portfolio and may have other wide ranging consequences, including downward pressure on economic growth and the potential for increased insurance and reinsurance exposures, which could have an adverse impact on our results of operations, financial condition, business and operations.

Mortgage insurance losses result when a borrower becomes unable to continue to make mortgage payments and the home of such borrower cannot be sold for an amount that covers unpaid principal and interest and the expenses of the sale. Deteriorating economic conditions increase the likelihood that borrowers will have insufficient income to pay their mortgages and can adversely affect housing values. In addition, natural disasters or other catastrophic events could result in increased claims if such events adversely affected the employment and income of borrowers and the value of homes. Any of these events or deteriorating economic conditions could cause our mortgage insurance losses to increase and adversely affect our results of operations and financial condition. See "Catastrophic Events and Severe Economic Events" in Item 7 for further details.

Our portfolio includes commercial mortgage backed securities ("CMBS"). At December 31, 2019, CMBS constituted approximately 3.3% of cash and invested assets held by Arch. The commercial real estate market may experience price deterioration, which could lead to delinquencies and losses on commercial real estate mortgages.

In addition, in each year, a significant portion of our mortgage insurance premiums will be from mortgage insurance written in prior years. The length of time insurance remains in force, referred to as persistency, is a significant driver of mortgage insurance revenues. Factors affecting persistency include: current mortgage interest rates compared to those rates on mortgages in our insurance in force, which affects the likelihood of the insurance in force to be subject to cancellation due to borrower refinancing; the amount of home equity, as homeowners with more equity in their homes can generally more readily move to a new residence or refinance their existing mortgage; and mortgage insurance cancellation policies and practices of mortgage investors and mortgage services and the cancellation of borrower-paid mortgage insurance, either upon request of the borrower or as required by law based upon the amortization of the loan. In 2018, the GSEs announced changes to various mortgage insurance termination requirements that are intended to further simplify the process of evaluating borrower-initiated requests for mortgage insurance termination. Among other things, these changes update evidence of value requirements for borrower requested cancellation based on the original value of the property and the current value of the property, raise Fannie Mae's loan-to-value ratio for cancellation based on substantial improvements from 75% or less to 80% or less, provide clarification regarding what constitutes substantial improvements to the property, allow servicers to respond to either verbal or written requests for mortgage insurance cancellation by a borrower, and provide servicers flexibility in evaluating the payment history of borrowers that have been impacted by certain disaster events.

Fannie Mae implemented these changes by March 1, 2019, although certain requirements were implemented as early as January 1, 2019. Freddie Mac's requirements became effective October 1, 2018. If these or other factors cause the length of time our mortgage insurance policies remain in force to decline, our mortgage insurance revenues could be adversely affected.

Significant, continued volatility in financial markets, changes in interest rates, a lack of pricing transparency, decreased market liquidity, declines in equity prices and the strengthening or weakening of foreign currencies against the U.S. Dollar, individually or in tandem, could have a material adverse effect on our results of operations, financial condition or cash flows through realized losses, impairments and changes in unrealized positions.

Uncertainty relating to the determination of LIBOR and the potential phasing out and replacement of LIBOR after 2021 may adversely affect our cost of capital, net investment income and mortgage reinsurance costs.

On July 27, 2017, the U.K. Financial Conduct Authority announced that it intends to stop persuading or compelling banks to submit LIBOR rates after 2021. As a result, LIBOR and certain other indices which are currently utilized as benchmarks are not expected to be published after 2021. LIBOR is the benchmark rate that is used by many banks and issuers to set interests in loan documents. Recognizing the need to replace LIBOR, authorities in the United States convened the Alternative Reference Rate Committee ("ARRC") in 2014 to identify a replacement for LIBOR. In 2017, the ARRC identified the Secured Overnight Financing Rate ("SOFR") - a combination of certain overnight repo rates, as its preferred alternative to LIBOR, and in April 2018, the Federal Reserve Bank of New York began publishing the SOFR rate. Because SOFR is an overnight rate, versus the various term rates that are available with LIBOR, and SOFR is also a risk-free rate, versus LIBOR which has an embedded credit charge, the transition from LIBOR to SOFR will require adjustments. The uncertainty of these adjustments, and the timing of when the transition will occur may adversely affect the value of and trading market for LIBOR-based securities. Moreover, the transition to SOFR from LIBOR for U.S. Dollar transactions as well as LIBOR transitions in other currencies and any future reform, replacement or disappearance of LIBOR may adversely affect the value of and return of our investment portfolio, our cost of capital and our cost of issuing Bellemeade mortgage risk transfer securities. We do not believe that it is possible to predict how markets will respond to the transition to SOFR from LIBOR on new or existing financial instruments or quantify the potential effect of any such event on us at this time. While we have an internal committee focused on managing the replacement of LIBOR for our investments and operations, we do not believe that it is possible to predict how markets will respond to the transition to SOFR, or any other rate, from LIBOR on new or existing financial instruments or quantify the potential effect of any such event on us at this time.

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.

On a quarterly basis, we perform reviews of our investments to determine whether declines in fair value below the cost basis are considered other-than-temporary in accordance with applicable accounting guidance regarding the recognition and presentation of other-than-temporary impairments. The process of determining whether a security is other-than-temporarily impaired requires judgment and involves analyzing many factors. These factors include: an analysis of the liquidity, business prospects and overall financial condition of the issuer; the time period in which there was a significant decline in value; the significance of the decline; and the analysis of specific credit events. There can be no assurance that our management has accurately assessed the level of impairments taken and allowances reflected in our financial statements. Furthermore, additional impairments may need to be taken or allowances provided for in the future. Historical trends may not be indicative of future impairments or allowances. Further, rapidly changing and unpredictable credit and equity market conditions could materially affect the valuation of securities carried at fair value as reported within our consolidated financial statements and the period-to-period changes in value could vary significantly. Decreases in value could have a material adverse effect on our financial condition and results of operations.

Certain of our investments are illiquid and are difficult to sell, or to sell in significant amounts at acceptable prices, to generate cash to meet our needs.

Our investments in certain securities, including certain fixed income and structured securities, investments in funds accounted for using the equity method, other alternative investments and strategic investments in joint ventures such as Watford, Premia and others, may be illiquid due to contractual provisions or investment market conditions. If we require significant amounts of cash on short notice in excess of anticipated cash requirements, then we may have difficulty selling these investments in a timely manner or may be forced to sell or terminate them at unfavorable values.

We may require additional capital or credit in the future, which may not be available or may only be available on unfavorable terms.

The capital requirements of our businesses depend on many factors, including regulatory and rating agency requirements, the performance of our investment portfolio, our ability to write new business successfully, the frequency and severity of catastrophe events and our ability to establish premium rates and reserves at levels sufficient to cover losses. We may need to raise additional funds through equity or debt financings. Any equity or debt financing, if available at all, may be on terms that are unfavorable to us. Equity financings could be dilutive to our existing shareholders and could result in the issuance of securities that have rights, preferences and privileges that are senior to those of our outstanding securities. If we are not able to obtain adequate capital, our business, results of operations and financial condition could be adversely affected. See "Capital Resources" in Item 7 for further details.

The loss of our key employees or our inability to retain them could negatively impact our business.

Our success has been, and will continue to be, dependent on our ability to retain the services of our existing key executive officers and to attract and retain additional qualified personnel in the future. The pool of talent from which we actively recruit is limited. Although, to date, we have not experienced difficulties in attracting and retaining key personnel, the inability to attract and retain qualified personnel could have a material adverse effect on our financial condition and results of operations. In addition, our underwriting staff is critical to our success in the production of business. While we do not consider any of our key executive officers or underwriters to be irreplaceable, the loss of the services of our key executive officers or underwriters or the inability to hire and retain other highly qualified personnel in the future could delay or prevent us from fully implementing our business strategy which could affect our financial performance.

Our information technology systems may be unable to meet the demands of customers.

Our information technology systems service our insurance portfolios. Accordingly, we are highly dependent on the effective operation of these systems. While we believe that the systems are adequate to service our insurance portfolios, there can be no assurance that they will operate in all manners in which we intend or possess all of the functionality required by customers currently or in the future.

Our customers, especially our mortgage insurance customers, require that we conduct our business in a secure manner, electronically via the Internet or via electronic data transmission. We must continually invest significant resources in establishing and maintaining electronic connectivity with customers. In order to integrate electronically with customers in the mortgage insurance industry, we require electronic connections between our systems and those of the industry's largest mortgage servicing systems and leading loan origination systems. Our mortgage group currently possesses connectivity with certain of these external systems, but there is no assurance that such connectivity is sufficient and we are continually undertaking new electronic integration efforts with third-party loan servicing and origination systems. We also rely on electronic integrations in our insurance operations, both in the U.S. and the U.K. The extent to which our insurance operations utilize electronic connections with external systems will expand to address the increasing importance of the use of the information technology for our insurance customers. Our business, financial condition and operating results may be adversely affected if we do not possess or timely acquire the requisite set of electronic integrations necessary to keep pace with the technological demands of customers.

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.

We rely on information technology systems to process, transmit, store and protect the electronic information, financial data and proprietary models that are critical to our business. Furthermore, a significant portion of the communications between our employees and our business partners and service providers depends on information technology and electronic information exchange. Like all companies, our information technology systems are vulnerable to data breaches, interruptions or failures due to events that may be beyond our control, including, but not limited to, natural disasters, power outages, theft, terrorist attacks, computer viruses, hackers, errors in usage and general technology failures. Additionally, our employees and vendors may use portable computers or mobile devices which may contain duplicate or similar information to that in our computer systems, and these devices can be stolen, lost or damaged. Security breaches could expose us to the loss or misuse of our information, litigation and potential liability. In addition, cyber incidents that impact the availability, reliability, speed, accuracy or other proper functioning of these systems could have a significant negative impact on our operations and possibly our results. A cyber incident could also result in a violation of applicable privacy and other laws, damage our reputation, cause a loss of customers, adversely affect our stock price, cause us to incur remediation costs, increased cybersecurity protection costs and/or increased insurance premiums, and/or give rise to monetary fines and other penalties, any of which could be significant and could adversely affect our business.

We have outsourced certain technology and business process functions to third parties and may continue do so in the future. Our outsourcing of certain technology and business process functions to third parties may expose us to increased risk related to data security, service disruptions or the effectiveness of our control system, which could result in monetary and reputational damage or harm to competitive position. These risks could increase as vendors increasingly offer cloud-based software services rather than software services which can be run within our data centers.

We believe that we have established and implemented appropriate security measures to provide reasonable assurance that our information technology systems are secure and appropriate controls and procedures to enable us to identify and respond to unauthorized access to such systems. We regularly engage third parties to evaluate and test the adequacy of our most critical security measures, controls and procedures. Despite these security measures, controls and procedures, disruptions to and breaches of our information technology systems are possible. Because we rely on our technology systems for many critical functions, including connecting with our customers, if such systems were to fail or be attacked or breached, we may experience a significant disruption in our operations and in the business we receive and process, which could adversely affect our results of operations and financial condition.

In addition, the regulatory environment surrounding information security and privacy is increasingly changing. We are subject to EU, U.S. federal, state and other foreign laws and regulations regarding the protection of personal data and information. These laws and regulations are complex and sometimes conflict. We could be subject to fines, penalties and/or regulatory enforcement actions in one or more jurisdictions if any person, including any employee, disregards or breaches, whether intentionally or negligently, controls intended to protect the confidential information of our employees or clients. Failure to timely report breach incidents under these regulations may also result in fines, penalties and/or other enforcement actions. As an example, the New York State Department of Financial Services adopted a regulation pertaining to cybersecurity for all banking and insurance entities under its jurisdiction that came into effect March 1, 2017. California also enacted the CCPA, which took effect January 1, 2020 and grants California consumers certain rights to, among other things, access and delete data about them subject to certain exceptions, as well as a private right of action with statutory penalties. Additionally, GDPR came into effect on May 25, 2018, and requires businesses offering goods and services to, or monitoring the behavior of, customers in the EU to comply with onerous accountability obligations and significantly enhanced conditions to processing personal data. Non-compliance with the GDPR could result in a fine of up to 4% of a firm's global annual revenue per violation. Our ability to conduct our business and our results of operations might be materially and adversely affected.

If the volume of low down payment mortgage originations declines, the amount of mortgage insurance we write in the U.S. could decline, which would reduce our mortgage insurance revenues.

The size of the U.S. mortgage insurance market depends in large part upon the volume of low down payment home mortgage originations. Factors affecting the volume of low down payment mortgage originations include, among others: restrictions on mortgage credit due to stringent underwriting standards and liquidity issues affecting lenders; changes in mortgage interest rates and home prices, and other economic conditions in the U.S. and regional economies; population trends, including the rate of household formation; and U.S. government housing policy. A decline in the volume of low down payment home mortgage originations could decrease demand for mortgage insurance, decrease our U.S. new insurance written and reduce mortgage insurance revenues.

If the role of the GSEs in the U.S. housing market changes, or if the GSEs change other policies or practices, the amount of mortgage insurance that we write could decline, which would reduce our mortgage insurance revenues.

The GSEs are the beneficiaries of the significant majority of the insurance policies we issue as a result of their purchases, statutorily required or otherwise, of qualifying mortgage loans from lenders or investors. The charters of the GSEs require credit enhancement for low down payment mortgages in order for such loans to be eligible for purchase or guarantee by the GSEs. If the charters of the GSEs were amended to change or eliminate the acceptability of private mortgage insurance, our mortgage insurance business could decline significantly. The FHFA has also indicated the possibility of amending the Preferred Stock Purchase Agreements ("PSPAs") that the GSEs have executed with the Department of Treasury or pursuing consent orders, in conjunction with releasing the GSEs from conservatorship, to place continuing restrictions on the GSEs post conservatorship. If the PSPAs include restrictions on the loans purchased by the GSEs, our mortgage insurance business could decline.

The premiums we charge for mortgage insurance on insured loans and the associated investment income may not be adequate to compensate for future losses from these loans.

We set premiums at the time a policy is issued based upon our expectations regarding likely performance over the life of insurance coverage. We generally cannot cancel mortgage insurance coverage or adjust renewal premiums during the life of a mortgage insurance policy. As a result, losses from higher than anticipated claims generally cannot be offset by premium increases on policies in force or mitigated by non-renewal or cancellation of insurance coverage. The premiums we charge on our insurance in force and the associated investment income may not be adequate to compensate us for the risks and costs associated with the insurance coverage provided to customers. An increase in the number or size of claims, compared to what we anticipate, could adversely affect Arch MI U.S.'s results of operations and financial condition.

GSE eligibility requirements for mortgage insurers could require us to contribute additional capital to Arch MI U.S. in the future, and could negatively impact our results of operations and financial condition, or reduce our operating flexibility.

Substantially all of Arch MI U.S.'s insurance written has been for loans sold to the GSEs. The PMIERs apply to Arch Mortgage Insurance Company and United Guaranty Residential Insurance Company, which are GSE-approved mortgage insurers ("eligible mortgage insurers"). The PMIERs impose limitations on the type of risk insured, the forms and insurance policies issued, standards for the geographic and customer diversification of risk, procedures for claims handling, acceptable underwriting practices, standards for certain reinsurance cessions and financial requirements, among other things. The financial requirements require a 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. Our eligible mortgage insurers each satisfied the PMIERs' financial requirements as of December 31, 2019.

The revised PMIERs also impose additional operational requirements in areas such as claim processing, loss mitigation, underwriting, quality control, and reporting. The revised requirements have caused us to make changes to our business practices and incur additional costs in order to achieve and maintain compliance with the PMIERs. While we do not expect the revised PMIERs to have a significant impact on our operations or a material impact on our capital position the increase in capital required to satisfy the revised PMIERs may decrease our return on capital.

While we intend to continue to comply with these requirements, there can be no assurance that the GSEs will continue to treat Arch Mortgage Insurance Company or United Guaranty Residential Insurance Company as eligible mortgage insurers. If either or both of the GSEs were to cease to consider Arch Mortgage Insurance Company or United Guaranty Residential Insurance Company as eligible mortgage insurers and, therefore, cease accepting our mortgage insurance products, our results of operations and financial condition would be adversely affected.

The mix of business we write affects Arch MI U.S.'s losses and will affect the minimum required assets Arch MI U.S. is required to maintain in order to comply with PMIERs financial requirements.

Our mortgage insurance portfolio includes loans with loan-to-value ratios exceeding 95%, loans with FICO scores below 620, adjustable rate mortgages, ("ARMs"), and less-than A quality loans. Even when housing values are stable or rising, we expect higher default and claim rates for high loan-to-value loans, loans with lower FICO scores, ARMs and less-than A quality loans. Although we attempt to incorporate the higher default and claim rates associated with these loans into our underwriting and pricing models, there can be no assurance that the premiums earned and the associated investment income will adequately compensate us for future losses from these loans. From time to time, we change the types of loans that we insure and the requirements under which we insure them. In 2017 and 2018, we modestly expanded our underwriting guidelines and we may further expand such guidelines in the future.

The geographic mix of Arch MI U.S.'s business could increase losses and harm our financial performance. We are affected by economic downturns and other events in specific regions of the United States where a large portion of our U.S. mortgage insurance business is concentrated. As of December 31, 2019, 7.7% of Arch MI U.S.'s primary risk-in-force was located in Texas, 7.1% was located in California and 5.3% was located in Florida. See the Mortgage Operations Supplemental Information section of "Critical Accounting Policies, Estimates and Recent Accounting Pronouncements" in Item 7 for further details.

Arch MI U.S.'s minimum required assets under the PMIERs will be determined, in part, by the particular risk profiles of the loans it insures. If, absent other changes, Arch MI U.S.'s mix of business changes to include more loans with higher loan-to-value ratios or lower credit scores, it will have a higher minimum required asset amount under the PMIERs and, accordingly, be required to hold more capital in order to maintain GSE eligibility.

Potential changes to state mortgage insurance regulations could reduce Arch MI U.S.'s profitability and its ability to compete with credit enhancement alternatives to mortgage insurance.

The NAIC, which reviews state insurance laws and regulations, has established a Mortgage Guaranty Insurance Working Group ("Working Group") to make recommendations to the NAIC's Financial Condition Committee regarding changes to the NAIC's Mortgage Guaranty Insurance Model Act. The Working Group has released a draft of the Model Act which includes proposed changes to minimum statutory capital requirements.

If the NAIC revises the Model Act, some state legislatures are likely to enact and implement part or all of the revised provisions. While we cannot predict the effect that any NAIC recommendations or future legislation may have on Arch MI U.S., such changes could reduce Arch MI U.S.'s profitability and its ability to compete with credit enhancement alternatives to mortgage insurance, which could adversely affect our financial condition or results of operations.

If servicers fail to adhere to appropriate servicing standards or experience disruptions to their businesses, our mortgage insurance operations could be adversely affected.

We depend on reliable, consistent third-party servicing of the loans that we insure. Among other things, our mortgage insurance policies require our customers and their servicers to timely submit premium and reports and utilize commercially reasonable efforts to limit and mitigate loss when a loan is in default. Without reliable, consistent third-party servicing, our insurance subsidiaries may be unable to correctly record new loans as they are underwritten, receive and process payments on insured loans and/or properly recognize and establish reserves on loans when a default exists or occurs but is not reported to us. In addition, if these servicers fail to limit and mitigate losses when appropriate, our losses may unexpectedly increase. If one or more servicers failed to adhere to these requirements, our financial results could be adversely affected.

The implementation of the Basel III Capital Accord may adversely affect the use of mortgage insurance by certain banks.

With certain exceptions, the Basel III Rules became effective on January 1, 2014. If further implementation of the Basel III Rules increases the capital requirements of banking organizations with respect to the residential mortgages we insure or does not provide sufficiently favorable treatment for the use of mortgage insurance, it could adversely affect the demand for mortgage insurance. In December 2017, the Basel Committee published final revisions to the Basel Capital Accord which is informally denominated in the U.S. as "Basel IV." The Basel Committee expects the new rules to be phased-in beginning in January 2020 and fully implemented by January 2027. In October 2019, the EU stated that it will conduct an "impact study" of the new rules before implementation, indicating that additional changes are possible. Under these revised rules, banks using the standardized approach for credit risk management will determine the risk-weight for residential mortgages based on the loan-to-value ratio at loan origination, without consideration of mortgage insurance. As prescribed at the international level, the new standard would permit consideration of mortgage insurance, but only if the company issuing the insurance has a lower risk-weight than the underlying exposure. Mortgage insurance issued by private companies would not meet this test in connection with residential mortgage. Therefore, under the 2017 international agreement, mortgage insurance could not mitigate credit and lower the capital charge under the standardized approach. To date the U.S. banking agencies have not begun the implementation of Basel IV standards. If the Basel IV standard is implemented in the U.S. without modification, mortgage insurance would not lower the loan-to-value ratio of residential loans for capital purposes, and therefore the demand for this product may decrease. It is also possible that the U.S. regulatory agencies could determine that their current capital rules are at least as stringent as the Basel IV standards, in which case no change would be required regarding the treatment of mortgage insurance for capital purposes. However, if the U.S. agencies decide to implement the new standards drafted by the Basel Committee, mortgage insurance would not lower the loan-to-value ratio of residential loans for capital purposes, and therefore may decrease the demand for this product.

Further, it is possible (but not mandated by the Basel Capital Accord) that the banking agencies and the GSEs might likewise discontinue taking mortgage insurance into account when determining a mortgage's loan-to-value ratio for prudential (non-capital) purposes. Additionally, a new risk-based capital proposal for the GSEs was published for comment by the FHFA in 2018. Under this proposal the capital requirements of these GSEs would take into account the existence of credit mitigants, such as mortgage insurance. However, mortgage insurance issued by monoline mortgage insurance companies would result in less capital relief than the capital relief afforded by other forms of credit mitigation, such as the issuance of credit-linked notes. In November 2019 the FHFA announced that it would re-propose the 2018 capital rules in 2020. In that announcement the FHFA explained that the re-proposed rule would be consistent with the goal of releasing the GSEs from conservatorship and ensuring that taxpayers will never be on the hook again during an economic downturn. If this rulemaking is finalized, a new capital framework for the Enterprises might disadvantage monoline mortgage insurance companies, or otherwise reduce the demand for this product. The capital rules proposed by FHFA may also prompt the banking regulators to re-examine the bank capital rules, and such action could disadvantage monoline mortgage insurance companies.

Some of the provisions of our bye-laws and our shareholders agreement may have the effect of hindering, delaying or preventing third party takeovers or changes in management initiated by shareholders. These provisions may also prevent our shareholders from receiving premium prices for their shares in an unsolicited takeover.

Some provisions of our bye-laws could have the effect of discouraging unsolicited takeover bids from third parties or changes in management initiated by shareholders. These provisions may encourage companies interested in acquiring us to negotiate in advance with our board of directors, since the board has the authority to overrule the operation of several of the limitations.

Among other things, our bye-laws provide: for a classified board of directors, in which the directors of the class elected at each annual general meeting holds office for a term of three years, with the term of each class expiring at successive annual general meetings of shareholders; that the number of directors is determined by the board from time to time by a vote of the majority of our board; that directors may only be removed for cause, and cause removal shall be deemed to exist only if the director whose removal is proposed has been convicted of a felony or been found by a court to be liable for gross negligence or misconduct in the performance of his or her duties; that our board has the right to fill vacancies, including vacancies created by an expansion of the board; and for limitations on a shareholder's right to raise proposals or nominate directors at general meetings. Our bye-laws provide that certain provisions which may have anti-takeover effects may be repealed or altered only with prior board approval and upon the affirmative vote of holders of shares representing at least 65% of the total voting power of our shares entitled generally to vote at an election of directors.

The bye-laws also contain a provision limiting the rights of any U.S. person (as defined in section 7701(a)(30) of the Internal Revenue Code of 1986, as amended (the "Code")) that owns shares of Arch Capital, directly, indirectly or constructively (within the meaning of section 958 of the Code), representing more than 9.9% of the voting power of all shares entitled to vote generally at an election of directors. The votes conferred by such shares of such U.S. person will be reduced by whatever amount is necessary so that after any such reduction the votes conferred by the shares of such person will constitute 9.9% of the total voting power of all shares entitled to vote generally at an election of directors. Notwithstanding this provision, the board may make such final adjustments to the aggregate number of votes conferred by the shares of any U.S. person that the board considers fair and reasonable in all circumstances to ensure that such votes represent 9.9% of the aggregate voting power of the votes conferred by all shares of Arch Capital entitled to vote generally at an election of directors. Arch Capital will assume that all shareholders (other than specified persons) are U.S. persons unless we receive assurance satisfactory to us that they are not U.S. persons.

The bye-laws also provide that the affirmative vote of at least 66 2/3% of the outstanding voting power of our shares (excluding shares owned by any person (and such person's affiliates and associates) that is the owner of 15% or more (a "15% Holder") of our outstanding voting shares) shall be required for various corporate actions, including: merger or consolidation of the company into a 15% Holder; sale of any or all of our assets to a 15% Holder; the issuance of voting securities to a 15% Holder; or amendment of these provisions; *provided*, *however*, the supermajority vote will not apply to any transaction approved by the board.

The provisions described above may have the effect of making more difficult or discouraging unsolicited takeover bids from third parties. To the extent that these effects occur, shareholders could be deprived of opportunities to realize takeover premiums for their shares and the market price of their shares could be depressed. In addition, these provisions could also result in the entrenchment of incumbent management.

There are regulatory limitations on the ownership and transfer of our common shares.

The jurisdictions in which our insurance and reinsurance subsidiaries operate have laws and regulations that require regulatory approval of a change in control of an insurer or an insurer's holding company. Where such laws apply to us and our subsidiaries, there can be no effective change in our control unless the person seeking to acquire control has filed a statement with the regulators and has obtained prior approval for the proposed change from such regulators. The usual measure for a presumptive change in control pursuant to these laws is the acquisition of 10% or more of the voting power of the insurance company or its parent, although this presumption is rebuttable. Consequently, a person may not acquire 10% or more of our common shares without the prior approval of the applicable insurance regulators. These laws may discourage potential acquisition proposals and may delay, deter or prevent a change in control of us, including transactions that some shareholders might consider to be desirable.

Our insurance and reinsurance subsidiaries are subject to regulation in various jurisdictions, and failure to comply with existing regulations or material changes in the regulation of their operations, or any investigations, inquiries or demands by government authorities, could adversely affect us.

Our insurance and reinsurance subsidiaries are subject to the laws and regulations of a number of jurisdictions worldwide, including Bermuda, the states in the U.S. in which such subsidiaries conduct business, the U.K., certain EU Member States, Canada, Switzerland, Australia and Hong Kong. Existing laws and regulations, among other things, limit the amount of dividends that can be paid to us by our insurance and reinsurance subsidiaries, prescribe solvency and capital adequacy standards, impose restrictions on the amount and type of investments that can be held to meet solvency and capital adequacy requirements, require the maintenance of reserve liabilities, and require pre-approval of acquisitions and certain affiliate transactions. Failure to comply with these laws and regulations or to maintain appropriate authorizations, licenses, and/or exemptions under applicable laws and regulations may cause governmental authorities to preclude or suspend our insurance or reinsurance subsidiaries from carrying on some or all of their activities, place one or more of them into rehabilitation or liquidation proceedings, impose monetary penalties or other sanctions on them or our affiliates, or commence insurance company delinquency proceedings against our insurance or reinsurance subsidiaries. The application of these laws and regulations by various governmental authorities, including authorities outside the U.S., may affect our liquidity and restrict our ability to expand our business operations through acquisitions or to pay dividends on our ordinary shares. Furthermore, compliance with legal and regulatory requirements may result in significant expenses, which could have a negative impact on our profitability.

In addition to legal and regulatory requirements, the insurance and reinsurance industry has experienced substantial volatility as a result of investigations, litigation and regulatory activity by various insurance, governmental and enforcement authorities, including the SEC, concerning certain practices within the insurance and reinsurance industry. Our involvement in any investigations, litigations or regulatory activity, including any related lawsuits, would cause us to incur legal costs and, if we or any of our insurance or reinsurance subsidiaries were found to have violated any laws or regulations, we could be required to pay fines and damages and incur other sanctions, perhaps in material amounts, which could have a material negative impact on our profitability.

Any such litigation or failure to comply with applicable laws could result in the imposition of significant restrictions on our ability to do business, and could also result in suspensions, injunctions, monetary damages, fines or other sanctions, any or all of which could adversely affect our financial condition and results of operations.

Our reinsurance subsidiaries may be required to provide collateral to ceding companies, by applicable regulators, their contracts or other commercial considerations. Their ability to conduct business could be significantly and negatively affected if they are unable to do so.

Arch Re Bermuda is a registered Bermuda insurance company and is not licensed or admitted as an insurer in any jurisdiction in the U.S., although Arch Re Bermuda has been approved as a “certified reinsurer” in certain U.S. states that allow reduced collateral for reinsurance ceded to such reinsurers. Arch Re Bermuda's contracts generally require it to post a letter of credit or provide other security, even in U.S. states where it has been approved for reduced collateral. State credit for reinsurance rules also generally provide that certified reinsurers such as Arch Re Bermuda must provide 100% collateral in the event their certified status is “terminated” or upon the entry of an order of rehabilitation, liquidation or conservation against a ceding insurer.

Although, to date, Arch Re Bermuda has not experienced any difficulties in providing collateral when required, if we are unable to post security in the form of letters of credit or trust funds when required, the operations of Arch Re Bermuda could be significantly and negatively affected.

Arch Capital is a holding company and is dependent on dividends and other distributions from its operating subsidiaries.

Arch Capital is a holding company whose assets primarily consist of the shares in our subsidiaries. Generally, Arch Capital depends on its available cash resources, liquid investments and dividends or other distributions from subsidiaries to make payments, including the payment of debt service obligations and operating expenses it may incur and any payments of dividends, redemption amounts or liquidation amounts with respect to our preferred shares and common shares, and to fund the share repurchase program. The ability of our regulated insurance and reinsurance subsidiaries to pay dividends or make distributions is dependent on their ability to meet applicable regulatory standards. In addition, the ability of our insurance and reinsurance subsidiaries to pay dividends to Arch Capital and to intermediate parent companies owned by Arch Capital could be constrained by our dependence on financial strength ratings from independent rating agencies. Our ratings from these agencies depend to a large extent on the capitalization levels of our insurance and reinsurance subsidiaries. We believe that Arch Capital has sufficient cash resources and available dividend capacity to service its indebtedness and other current outstanding obligations. See “Capital Resources” in Item 7 for further details.

The service of process and enforcement of judgments against us or our directors or officers may be difficult.

We are a Bermuda company and some of our officers and directors are residents of various jurisdictions outside the U.S. All or a substantial portion of our assets and the assets of those persons may be located outside the U.S. As a result, it may be difficult for investors to effect service of process within the U.S. upon those persons or to recover against us or those persons on judgments of U.S. courts based on civil liabilities provisions of the U.S. federal securities laws even though we have appointed National Registered Agents, Inc., New York, New York, as our agent for service of process with respect to actions based on offers and sales of securities made in the U.S. Because there is no treaty in effect between the U.S. and Bermuda providing for reciprocal recognition and enforcement of judgments of U.S. courts in civil and commercial matters, a final judgment for the payment of money rendered by a court in the U.S. based on civil liability, whether or not predicated solely upon the U.S. federal securities laws, would not be automatically enforceable in Bermuda, and there are grounds upon which Bermuda courts may not enforce judgments of U.S. courts. Further, no claim may be brought in Bermuda against us or our directors and officers for violation of U.S. federal securities laws, as such laws do not have force of law in Bermuda. A Bermuda court may, however, impose civil liability on us or our directors and officers in a suit brought in the Supreme Court of Bermuda if the facts alleged in the complaint constitute or give rise to a cause of action under Bermuda law.

Our international business is subject to applicable laws and regulations relating to sanctions and foreign corrupt practices, the violation of which could adversely affect our operations.

We must comply with all applicable economic sanctions and anti-bribery laws and regulations of the U.S. and other foreign jurisdictions where we operate, including the U.K., Ireland and the EU. U.S. laws and regulations applicable to us include the economic trade sanctions laws and regulations administered by the Treasury’s Office of Foreign Assets Control as well as certain laws administered by the U.S. Department of State. New sanction regimes may be initiated, or existing sanctions expanded, at any time, which can immediately impact our business activities. In addition, we are subject to the Foreign Corrupt Practices Act and other anti-bribery laws such as the U.K. Bribery Act that generally bar corrupt payments or unreasonable gifts to foreign governments or officials. Although we have policies and controls in place that are designed to ensure compliance with these laws and regulations, it is possible that an employee or intermediary could fail to comply with applicable laws and regulations. In such event, we could be exposed to civil penalties, criminal penalties and other sanctions, including fines or other punitive actions. In addition, such violations could damage our business and/or our reputation. Such criminal or civil sanctions, penalties, other sanctions, and damage to our business and/or reputation could have a material adverse effect on our financial condition and results of operations.

Risk Relating to Our Shares

The market price of our common shares may experience volatility, thereby causing a potential loss of value to our investors.

The market price for our common shares may fluctuate substantially and could cause investment losses. The price of our common shares may not remain at or exceed current levels. In addition to the risk factors described herein, the following factors may have an adverse impact on the market price for our common shares: announcements by us or our competitors of acquisitions, investments or strategic alliances; changes in the value of our assets; our actual or anticipated quarterly and annual operating results; changes in expectations of future financial performance or changes in estimates of securities analysts; issuances by us of shares or other securities; sales, or the possibility or perception of future sales, by our existing shareholders; our share repurchase program; changes in general conditions in the economy, the insurance industry or the financial markets; changes in market valuation of companies in the insurance and reinsurance industry; fluctuations in stock market processes and volumes; the addition or departure of key personnel; changes in tax law; and adverse press or news announcements affecting us or the industry.

General market conditions and unpredictable factors could adversely affect market prices for our outstanding preferred shares.

There can be no assurance about the market prices for our series of preferred shares that are traded publicly. Several factors, many of which are beyond our control, will influence the fair value of our preferred shares, including, but not limited to:

- whether dividends have been declared and are likely to be declared on any series of our preferred shares from time to time;
- our creditworthiness, financial condition, performance and prospects;
- whether the ratings on any series of our preferred shares provided by any ratings agency have changed;
- the market for similar securities; and
- economic, financial, geopolitical, regulatory or judicial events that affect us and/or the insurance or financial markets generally.

Dividends on our preferred shares are non-cumulative.

Dividends on our preferred shares are non-cumulative and payable only out of lawfully available funds of Arch Capital under Bermuda law. Consequently, if Arch Capital's board of directors (or a duly authorized committee of the board) does not authorize and declare a dividend for any dividend period with respect to any series of our preferred shares, holders of such preferred shares would not be entitled to receive any such dividend, and such unpaid dividend will not accrue and will never be payable. Arch Capital will have no obligation to pay dividends for a dividend period on or after the dividend payment date for such period if its board of directors (or a duly authorized committee of the board) has not declared such dividend before the related dividend payment date; if dividends on our series E or series F preferred shares are authorized and declared with respect to any subsequent dividend period, Arch Capital will be free to pay dividends on any other series of preferred shares and/or our common shares. In the past, we have not paid dividends on our common shares.

Our preferred shares are equity and are subordinate to our existing and future indebtedness.

Our preferred shares are equity interests and do not constitute indebtedness. As such, these preferred shares will rank junior to all of our indebtedness and other non-equity claims with respect to assets available to satisfy our claims, including in our liquidation. As of December 31, 2019, our total long-term debt was $1.73 billion, excluding the ‘other’ segment. We may incur additional debt in the future. Our existing and future indebtedness may restrict payments of dividends on our preferred shares. Additionally, unlike indebtedness, where principal and interest would customarily be payable on specified due dates, in the case of preferred shares, (1) dividends are payable only if declared by the board of directors of Arch Capital (or a duly authorized committee of the board) and (2) as described under “Risks Relating to Our Company—Arch Capital is a holding company and is dependent on dividends and other distributions from its operating subsidiaries,” we are subject to certain regulatory and other constraints affecting our ability to pay dividends and make other payments.

The voting rights of holders of our preferred shares are limited.

Holders of our preferred shares have no voting rights with respect to matters that generally require the approval of voting shareholders. The limited voting rights of holders of our preferred shares include the right to vote as a class on certain fundamental matters that affect the preference or special rights of our preferred shares as set forth in the certificate of designations relating to each series of preferred shares. In addition, if dividends on our series E or series F preferred shares have not been declared or paid for the equivalent of six dividend payments, whether or not for consecutive dividend periods, holders of the outstanding series E or series F preferred shares will be entitled to vote for the election of two additional directors to our board of directors subject to the terms and to the limited extent as set forth in the certificate of designations relating to such series of preferred shares.

There is no limitation on our issuance of securities that rank equally with or senior to our preferred shares.

We may issue additional securities that rank equally with or senior to our series E and series F preferred shares without limitation. The issuance of securities ranking equally with or senior to our preferred shares may reduce the amount available for dividends and the amount recoverable by holders of such series in the event of a liquidation, dissolution or winding-up of Arch Capital.

Risks Relating to Taxation

We and our non-U.S. subsidiaries may become subject to U.S. federal income taxation and/or the U.S. federal income tax liabilities of our U.S. subsidiaries may increase, including as a result of changes in tax law.

Arch Capital and its non-U.S. subsidiaries intend to operate their business in a manner that will not cause them to be treated as engaged in a trade or business in the U.S. and, thus, will not be required to pay U.S. federal income taxes (other than U.S. excise taxes on insurance and reinsurance premium and withholding taxes on certain U.S. source investment income) on their income. However, because there is uncertainty as to the activities which constitute being engaged in a trade or business in the U.S., there can be no assurances that the IRS will not contend successfully that Arch Capital or its non-U.S. subsidiaries are engaged in a trade or business in the U.S. If Arch Capital or any of its non-U.S. subsidiaries were subject to U.S. income tax, our shareholders' equity and earnings could be adversely affected.

Congress has been considering several legislative proposals intended to eliminate certain perceived tax advantages of Bermuda and other non-U.S. insurance companies. There is no assurance that any such legislative proposal will not be enacted into law and any such enacted law would not adversely affect income tax liabilities of us or any of our subsidiaries.

The enactment and implementation of the Tax Cuts Act may have a material and adverse impact on our operations and financial condition.

The Tax Cuts Act includes significant changes to the taxation of business entities. These changes include, among others, a permanent reduction to the corporate income tax rate. Notwithstanding the reduction in the corporate income tax rate, the overall impact of this tax reform is uncertain, and our business and financial condition could be materially and adversely affected.

Certain provisions in the Tax Cuts Act could have a material and adverse impact on our financial condition and business operation. One such provision imposes a 10% minimum base erosion and anti-abuse tax (reduced to 5% for the 2018 taxable year and increased to 12.5% for the 2026 taxable year and the subsequent taxable years) on the "modified taxable income" of a U.S. corporation (or a non-U.S. corporation engaged in a U.S. trade or business) over such corporation's regular U.S. federal income tax, reduced by certain tax credits. The "modified taxable income" of a corporation is determined without deduction for certain payments by such corporation to its non-U.S. affiliates (including reinsurance premiums). Other provisions of the Tax Cuts Act that could have a material and adverse impact on us include a provision that defers or disallows a U.S. corporation's deduction of interest expense to the extent such interest expense exceeds a specified percentage of such U.S. corporation's "adjusted taxable income" and a provision that adjusts the manner in which a U.S. property and casualty insurance company computes its loss reserve. There is no assurance that subsequent change in tax laws will not materially and adversely affect our operations and financial condition.

The results of the 2020 U.S. presidential election could have further impacts on our industry if new legislative or regulatory reforms are adopted. We are unable to predict at this time the effect of any such reforms.

Our non-U.K. companies may be subject to U.K. tax that may have a material adverse effect on our results of operations.

We intend to operate in such a manner so that none of our companies, other than our U.K. subsidiaries and branch operations (the "U.K. Group"), should be resident in the U.K. for tax purposes or carry on a trade, whether or not through a permanent establishment, in the U.K. Accordingly, we do not expect that any of our other subsidiaries, other than the U.K. Group, should be subject to U.K. tax. Case law has held that whether or not a trade is being carried on in the U.K. is a matter of fact and emphasis is placed on where the operations take place from which the profits in substance arise. HM Revenue and Customs might contend successfully that one or more of our subsidiaries, in addition to the U.K. Group, is carrying on a trade in the U.K. For U.K. tax purposes, a non-U.K. tax resident company will be subject to U.K. corporation tax only if it carries on a trade through a permanent establishment in the U.K. However, that subsidiary may still be subject to U.K. income tax if it carries on a trade in the U.K., without a permanent establishment, unless it is entitled to the protection afforded by a double tax treaty between the U.K. and the jurisdiction in which that company is resident. If any of our subsidiaries is treated as resident, or carrying on a trade, in the U.K., whether or not through a permanent establishment, and, therefore, subject to U.K. tax, our results of operations could be materially adversely affected.

We may become subject to taxes in Bermuda after March 31, 2035, which may have a material adverse effect on our results of operations.

Under current Bermuda law, we are not subject to tax on income, profits, withholding, capital gains or capital transfers. Furthermore, we have obtained from the Minister of Finance of Bermuda under the Exempted Undertakings Tax Protection Act 1966 of Bermuda, an assurance that, in the event that Bermuda enacts legislation imposing tax computed on profits, income, any capital asset, gain or appreciation, or any tax in the nature of estate duty or inheritance tax, then the imposition of the tax will not be applicable to us or our operations until March 31, 2035. We could be subject to taxes in Bermuda after that date. This assurance does not, however, prevent the imposition of taxes on any person ordinarily resident in Bermuda or any company in respect of its ownership of real property or leasehold interests in Bermuda.

The impact of Bermuda's letter of commitment to the OECD to eliminate harmful tax practices is uncertain and could adversely affect our tax status in Bermuda.

The Organization for Economic Cooperation and Development (“OECD”) has published reports and launched a global initiative among member and non-member countries on measures to limit harmful tax competition. These measures are largely directed at counteracting the effects of tax havens and preferential tax regimes in countries around the world. Bermuda was not listed in the most recent report as an uncooperative tax haven jurisdiction because it had previously committed to eliminate harmful tax practices, to embrace international tax standards for transparency, to exchange information and to eliminate an environment that attracts business with no substantial domestic activity. We are not able to predict what changes will arise from the commitment or whether such changes will subject us to additional taxes.

The impact of commitments made by the government of Bermuda in order to avoid being named on the EU’s list of non-cooperative tax jurisdictions is uncertain and could have an adverse effect on our results of operations.

Following a year-long screening process, on December 5, 2017 the Council of the European Union published its list of non-cooperative jurisdictions for tax purposes (the “EU Blacklist”). Bermuda was not named on the EU Blacklist due to commitments made by its government to improve certain “substance requirement” deficiencies that were identified by the EU during the screening process. This commitment led to the passing of the ES Act in December 2018. See “Economic Substance Act” under the heading “Regulation” for further details. As noted above, the ES Act requires in-scope Bermuda entities to demonstrate that they have adequate economic substance in Bermuda. Broadly, this is expected to be the case where an entity can demonstrate it has adequate income generating activities, employees, premises, and expenditure incurred in Bermuda, although the meaning of “adequate” in this context remains unclear. Further, the speed with which the ES Act was implemented, and the uncertainties in its interpretation, make it difficult to predict its future impact. Any entity found to be lacking adequate economic substance may be fined or ordered by a court to take action to remedy such failure (or face being struck off the companies register). As a result, there is a risk that non-compliance with its economic substance requirements under the ES Act could require Arch to enhance its infrastructure in Bermuda, and this may result in some additional operational expenditures, increased tax liabilities and/or compliance costs for Arch.

We may become subject to increased taxation in Bermuda and other countries as a result of the OECD's plan on “Base erosion and profit shifting.”

The OECD, with the support of the G20, initiated the “base erosion and profit shifting” (“BEPS”) project in 2013 in response to concerns that international tax standards have not kept pace with changes in global business practices and that changes are needed to international tax laws to address situations where multinationals may pay little or no tax in certain jurisdictions by shifting profits away from jurisdictions where the activities creating those profits may take place. In October 2015, the OECD issued “final reports” in connection with the BEPS project. The final reports were approved for adoption by the G20 finance ministers in November 2015. The final reports provide the basis for international standards for corporate taxation that are designed to prevent, among other things, the artificial shifting of income to tax havens and low-tax jurisdictions, the erosion of the tax base through interest deductions on intercompany debt and the artificial avoidance of permanent establishments (i.e., tax nexus with a jurisdiction).

Legislation to adopt these standards has been enacted or is currently under consideration in a number of jurisdictions to implement these standards, including country by country reporting. As a result, our income may be taxed in jurisdictions where it is not currently taxed and at higher rates of tax than currently taxed, which may substantially increase our effective tax rate. Also, the continued adoption of these standards may increase the complexity and costs associated with tax compliance and adversely affect our financial position and results of operations.

In May 2019, the OECD published a “Programme of Work,” divided into two pillars, which is designed to address the tax challenges created by an increasing digitalized economy. Pillar One addresses the broader challenge of a digitalized economy and focuses on the allocation of group profits among taxing jurisdictions based on a market-based concept rather than historical “permanent establishment” concepts. Pillar Two addresses the remaining BEPS risk of profit shifting to entities in low tax jurisdictions by introducing a global minimum tax and a proposed tax on base eroding payments, which would operate through a denial of a deduction or imposition of source-based taxation (including withholding tax) on certain payments. In January 2020, the OECD released a statement excluding most financial services activities, including insurance activities, from the scope of the profit reallocation mechanism in Pillar I. The OECD statement cited the presence of commercial (rather than consumer) customers as grounds for the carve-out, but also acknowledged that a “compelling case” could be made that the consumer-facing business lines of insurance companies should be excluded from the scope of Pillar I given the impact of regulations and licensing requirements that typically ensure that residual profits are largely realized in local customer markets. However, the OECD noted that the proper scope for Pillar I as applied to “unregulated elements of the financial services sector” may require further consideration. The OECD expects to reach agreement on key policy issues by July 2020, with a final proposal to be agreed to by the participating members by the end of 2020 and incorporated into local jurisdiction tax laws and treaties sometime shortly thereafter. To date, the proposal has been written broadly enough to potentially apply to our activities, and we are unable to determine at this time when such measures would be implemented and if so, whether they will be in a form that whether it would have a material adverse impact on our operations and results.

The EU’s review of harmful tax competition could adversely affect our business, financial condition and results of operations.

During 2017, the EU Economic and Financial Affairs Council (“ECOFIN”) released a list of noncooperative jurisdictions for tax purposes. The stated aim of this list, and accompanying report, was to promote good governance worldwide in order to maximize efforts to prevent tax fraud and tax evasion. Bermuda was not on the list of non-cooperative jurisdictions, but did feature in the report (along with approximately 40 other jurisdictions) as having committed to address concerns relating to economic substance by December 31, 2018. In accordance with that commitment, Bermuda has enacted legislation that requires certain entities in Bermuda engaged in “relevant activities” to maintain a substantial economic presence in Bermuda and to satisfy economic substance requirements. The list of “relevant activities” includes carrying on as a business any one or more of: banking, insurance, fund management, financing, leasing, headquarters, shipping, distribution and service center, intellectual property and holding entities. Any entity that must satisfy economic substance requirements but fails to do so could face automatic disclosure to competent authorities in the EU of the information filed by the entity with the Bermuda Registrar of Companies in connection with the economic substance requirements and may also face financial penalties, restriction or regulation of its business activities and/or may be struck off as a registered entity in Bermuda.

At present, the impact of these new economic substance requirements is unclear, and it is impossible to predict the nature and effect of these requirements on us. The new economic substance requirements may increase the complexity and costs of carrying on our business and adversely affect our financial condition and results of operations.

Application of the EU Anti-Tax Avoidance Directives

As part of the BEPS project, the EU Council adopted on 12 July 2016 Council Directive (EU) 2016/1164 ("ATAD I"), as amended by Council Directive (EU) 2017/952 ("ATAD II", together with ATAD I, "ATAD"), to provide for minimum standard across EU Member States for tackling aggressive tax planning involving hybrid tax mismatches and interest deductibility. ATAD I was required to be transposed into domestic Member State law with effect from January 1, 2019, whilst ATAD II was required to be transposed into domestic Member State law with effect from January 1, 2020 (with an exception in respect of reverse hybrid mismatch provisions, which should take effect from January 1, 2021). The full impact of the application of ATAD is not yet clear. However, ATAD could adversely affect our financial position and operations, including through the increase of our: (i) our tax burden; (ii) expenditure to ensure compliance; and (iii) administrative burden.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We lease office space in Bermuda where our principal offices are located. Our insurance group leases space for offices in the U.S., Canada, Bermuda, Europe and Australia. Our reinsurance group leases space for offices in the U.S., Bermuda, Europe, Canada and Dubai. Our mortgage group leases space for offices in the U.S., Hong Kong and Australia. We believe that the above described office space is adequate for our needs. However, as we continue to develop our business, we may open additional office locations in 2020.

ITEM 3. 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 December 31, 2019, 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 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

HOLDERS

As of February 25, 2020, and based on information provided to us by our transfer agent and proxy solicitor, there were 784 holders of record of our common shares (NASDAQ: ACGL) and approximately 64,200 beneficial holders of our common shares.

ISSUER PURCHASES OF EQUITY SECURITIES

The following table summarizes our purchases of common shares for the 2019 fourth quarter:

	Issuer Purchases of Common Shares			
Period	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)
10/1/2019-10/31/2019	15,288	$ 41.66	—	$ 160,867
11/1/2019-11/30/2019	28,671	$ 41.27	—	$ 1,000,000
12/1/2019-12/31/2019	11,361	$ 42.06	—	$ 1,000,000
Total	55,320	$ 41.54	—	$ 1,000,000

(1) Includes 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 market 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.

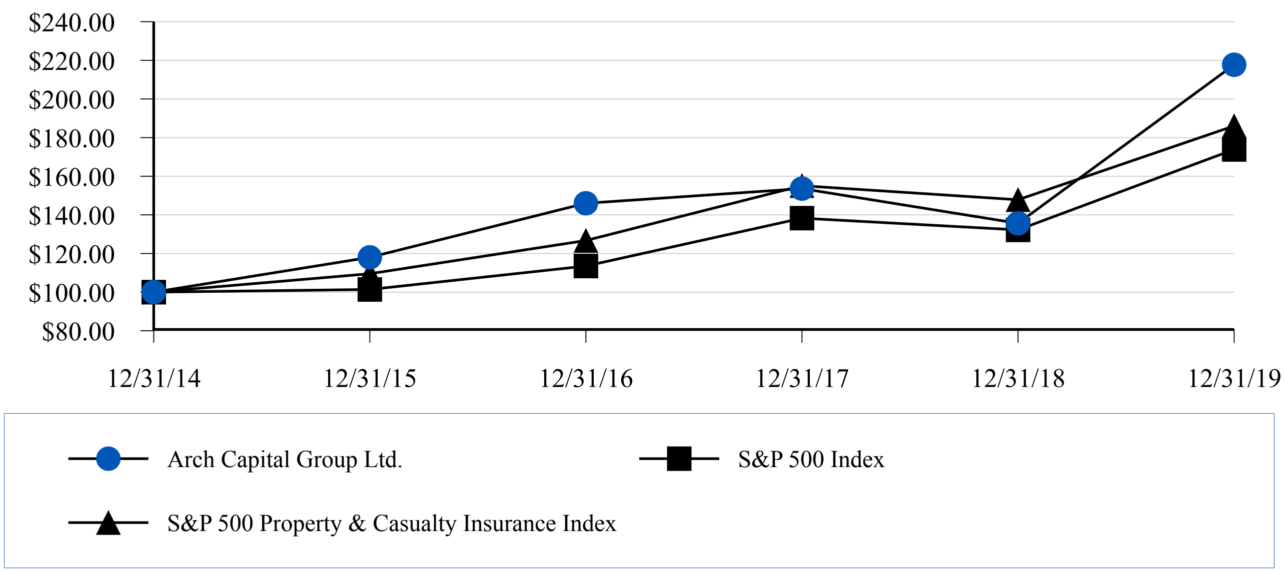
(2) In November 2019, the Board of Arch Capital increased the share repurchase authorization to $1.0 billion, under which repurchases may be effected from time to time in open market or privately negotiated transactions through December 31, 2021.

Table of Contents

PERFORMANCE GRAPH

The following graph compares the cumulative total shareholder return on our common shares for each of the last five years through December 31, 2019 to the cumulative total return, assuming reinvestment of dividends, of (1) S&P 500 Composite Stock Index ("S&P 500 Index") and (2) the S&P 500 Property & Casualty Insurance Index. The share price performance presented below is not necessarily indicative of future results.

CUMULATIVE TOTAL SHAREHOLDER RETURN (1)(2)(3)



	Base Period					
Company Name/Index	**12/31/14**	**12/31/15**	**12/31/16**	**12/31/17**	**12/31/18**	**12/31/19**
● **Arch Capital Group Ltd.**	$100.00	$118.02	$146.01	$153.59	$135.63	$217.72
■ **S&P 500 Index**	$100.00	$101.38	$113.51	$138.29	$132.23	$173.86
▲ **S&P 500 Property & Casualty Insurance Index**	$100.00	$109.53	$126.73	$155.10	$147.83	$186.07

(1) Stock price appreciation plus dividends.
(2) The above graph assumes that the value of the investment was $100 on December 31, 2014.
(3) This graph is not "soliciting material," is not deemed filed with the SEC and is not to be incorporated by reference in any filing by us under the Securities Act of 1933 or the Securities and Exchange Act of 1934, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

ITEM 6. SELECTED FINANCIAL DATA

The following tables set forth summary historical consolidated financial and operating data (including the results of the 'other' segment) and should be read in conjunction with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and the related notes.

(U.S. dollars in thousands except share data)	Year Ended December 31, 2019	2018	2017	2016	2015
Statement of Income Data:					
Net premiums written	$ 6,039,067	$ 5,346,747	$ 4,961,373	$ 4,031,391	$ 3,817,531
Net premiums earned	5,786,498	5,231,975	4,844,532	3,884,822	3,733,905
Net investment income	627,738	563,633	470,872	366,742	348,090
Equity in net income (loss) of investments accounted for using the equity method	123,672	45,641	142,286	48,475	25,455
Net realized gains (losses)	366,363	(405,344)	149,141	137,586	(185,842)
Total revenues	6,928,200	5,450,568	5,627,375	4,463,556	3,936,590
Income before income taxes	1,849,110	841,772	757,277	855,552	567,194
Net income	$ 1,693,300	$ 727,821	$ 629,709	$ 824,178	$ 526,582
Net (income) loss attributable to noncontrolling interests	(56,981)	30,150	(10,431)	(131,440)	11,156
Net income available to Arch	1,636,319	757,971	619,278	692,738	537,738
Preferred dividends	(41,612)	(41,645)	(46,041)	(28,070)	(21,938)
Loss on redemption of preferred shares	—	(2,710)	(6,735)	—	—
Net income available to Arch common shareholders	$ 1,594,707	$ 713,616	$ 566,502	$ 664,668	$ 515,800
Diluted net income per share	$ 3.87	$ 1.73	$ 1.36	$ 1.78	$ 1.36
Cash dividends per share	—	—	—	—	—
After-tax operating income available to Arch common shareholders (1)	$ 1,162,639	$ 909,190	$ 447,155	$ 577,444	$ 565,199
After-tax operating income available to Arch common shareholders per share — diluted (1)	$ 2.82	$ 2.20	$ 1.07	$ 1.54	$ 1.49
After-tax return on average common equity (2)	16.5%	8.4%	7.2%	10.9%	8.9%
After-tax operating return on average common equity (2)	12.0%	10.7%	5.7%	9.4%	9.7%
Weighted average common shares and common share equivalents outstanding — diluted (2)	411,609,478	412,906,478	417,785,025	374,152,479	378,116,229

(1) After-tax operating income available to Arch common shareholders is defined as net income available to Arch common shareholders, excluding net realized gains or losses, net impairment losses included in earnings, equity in net income or loss of investments accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other and loss on redemption of preferred shares, net of income taxes. The presentation of after-tax operating income available to Arch common shareholders is a "non-GAAP financial measure" as defined in Regulation G. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Comment on Non-GAAP Financial Measures" for further details.

(2) Equals after-tax operating income available to Arch common shareholders divided by the average of beginning and ending common shareholders' equity for each period presented. For the 2016 period, the return on average common shareholders' equity reflects the weighted impact of the $1.10 billion of convertible non-voting common equivalent preferred shares, which were issued on December 31, 2016 as part of the UGC acquisition.

(U.S. dollars in thousands except share data)	December 31, 2019	2018	2017	2016	2015
Balance Sheet Data:					
Total investable assets (1)	$ 24,990,265	$ 22,324,524	$ 22,156,488	$ 20,493,952	$ 16,340,938
Premiums receivable	1,778,717	1,299,150	1,135,249	1,072,435	983,443
Reinsurance recoverables on unpaid and paid losses and loss adjustment expenses	4,346,816	2,919,372	2,540,143	2,114,138	1,867,373
Total assets	37,885,361	32,218,329	32,051,658	29,372,109	23,138,931
Reserves for losses and loss adjustment expenses:					
Before unpaid losses and loss adjustment expenses recoverable	13,891,842	11,853,297	11,383,792	10,200,960	9,125,250
Net of unpaid losses and loss adjustment expenses recoverable	9,809,192	9,039,006	8,918,882	8,117,385	7,296,413
Unearned premiums:					
Before ceded unearned premiums	4,339,549	3,753,636	3,622,314	3,406,870	2,333,932
Net of ceded unearned premiums	3,104,866	2,778,167	2,695,703	2,547,303	1,906,323
Senior notes	1,871,626	1,733,528	1,732,884	1,732,258	791,306
Revolving credit agreement borrowings	484,287	455,682	816,132	756,650	530,434
Total liabilities	25,569,809	21,780,650	21,805,723	20,060,984	16,028,376
Total shareholders’ equity	12,260,148	10,231,387	10,040,013	9,105,572	6,905,373
Total shareholders' equity available to Arch	11,497,371	9,439,827	9,196,602	8,253,718	6,166,542
Preferred shareholders' equity	780,000	780,000	872,555	772,555	325,000
Common shareholders' equity available to Arch	$ 10,717,371	$ 8,659,827	$ 8,324,047	$ 7,481,163	$ 5,841,542
Common shares and common share equivalents outstanding, net of treasury shares (2)	405,619,201	402,454,834	409,956,417	406,651,011	367,883,349
Book value per share (2) (3)	$ 26.42	$ 21.52	$ 20.30	$ 18.40	$ 15.88

(1) This table excludes the collateral received and reinvested and includes the securities pledged under securities lending agreements, at fair value.

(2) Reflects the impact of outstanding convertible non-voting common equivalent preferred shares which were issued on December 31, 2016 as part of the UGC acquisition.

(3) Excludes the effects of stock options and restricted stock and performance units.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following is a discussion and analysis of the financial condition and results of operations for the year ended December 31, 2019 and 2018, including comparisons between 2019 and 2018. Comparisons between 2018 and 2017 have been omitted from this Form 10-K, but may be found in "Management's Discussion and Analysis of Financial Condition and Results of Operations" in Part II, Item 7 of the Company's Annual Report on Form 10-K year ended December 31, 2018 filed with the SEC. This discussion and analysis contains forward-looking statements which involve inherent risks and uncertainties. All statements other than statements of historical fact are forward-looking statements. These statements are based on our current assessment of risks and uncertainties. Actual results may differ materially from those expressed or implied in these statements and, therefore, undue reliance should not be placed on them. Important factors that could cause actual events or results to differ materially from those indicated in such statements are discussed in this report, including the sections entitled "Cautionary Note Regarding Forward-Looking Statements," and "Risk Factors."

This discussion and analysis should be read in conjunction with our audited consolidated financial statements and notes thereto presented under Item 8. Tabular amounts are in U.S. Dollars in thousands, except share amounts, unless otherwise noted.

GENERAL

Overview

Arch Capital Group Ltd. ("Arch Capital" and, together with its subsidiaries, "we" or "us") is a Bermuda public limited liability company with approximately $13.23 billion in capital at December 31, 2019 and, through operations in Bermuda, the United States, Europe, Canada, Australia and Hong Kong, writes specialty lines of property and casualty insurance and reinsurance, as well as mortgage insurance and reinsurance, on a worldwide basis. It is our belief that our underwriting platform, our experienced management team and our strong capital base have enabled us to establish a strong presence in the insurance and reinsurance markets.

The worldwide property casualty insurance and reinsurance industry is highly competitive and has traditionally been subject to an underwriting cycle in which a hard market (high premium rates, restrictive underwriting standards, as well as terms and conditions, and underwriting gains) is eventually followed by a soft market (low premium rates, relaxed underwriting standards, as well as broader terms and conditions, and underwriting losses). Property casualty market conditions may affect, among other things, the demand for our products, our ability to increase premium rates, the terms and conditions of the insurance policies we write, changes in the products offered by us or changes in our business strategy.

The financial results of the property casualty insurance and reinsurance industry are influenced by factors such as the frequency and/or severity of claims and losses, including natural disasters or other catastrophic events, variations in interest rates and financial markets, changes in the legal, regulatory and judicial environments, inflationary pressures and general economic conditions. These factors influence, among other things, the demand for insurance or reinsurance, the supply of which is generally related to the total capital of competitors in the market.

Mortgage insurance and reinsurance is subject to similar cycles to property casualty except that they have historically been more dependent on macroeconomic conditions.

Current Outlook

Our objective is to achieve an average operating return on average equity of 15% or greater over the insurance cycle, which we believe to be an attractive return to our common shareholders given the risks we assume. 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.

In 2019, property and casualty rates increased in many lines of business and we believe that insurance markets remain in a transitioning phase. Given the uncertainty of current claim trends, the industry needs further rate increases to provide insurers an adequate buffer and a positive risk-reward proposition. In this kind of environment, risk selection and active capital allocation remain critical to generating superior returns. Strengthening market conditions are evident to us from both the rise in our submission activity and our ability to achieve significant rate increases across numerous lines of business.

Reinsurance pricing tends to follow that of the primary insurance industry although catastrophe and large attritional losses, such as the Japanese typhoons this year, can disproportionately affect results and create opportunities in the reinsurance market. We believe that property facultative and marine businesses are examples of improving markets.

Our underwriting teams continue to execute a disciplined strategy by emphasizing small and medium-sized accounts over large accounts, shrinking premiums in more commoditized lines such as general liability and by utilizing reinsurance purchases to reduce volatility on large account, high capacity business. The spread between rate changes and loss trend continues to be a key variable in assessing expected returns and can be difficult to quantify precisely, particularly in specialty lines.

Our mortgage segment continues to experience generally favorable market conditions. Although pricing remains competitive in the U.S., borrower credit quality and the general economy remain strong. Our results continue to reflect our success in making high quality credit underwriting risk decisions and building customer relationships.

Arch remains committed to providing solutions across many offerings as the marketplace evolves, including new mortgage credit risk transfer programs initiated by government sponsored enterprises, or "GSEs," in 2018. Such programs have begun generating business with banks developing new systems to handle the programs and momentum beginning to build. In addition, we completed multiple Bellemeade risk transfers to the capital markets throughout 2019, increasing our protection for mortgage tail risk.

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 and common share equivalents 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 $26.42 at December 31, 2019, a 22.8% increase from $21.52 at December 31, 2018. The growth in 2019 reflected strong mortgage insurance underwriting performance 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 average common shareholders' equity available to Arch during the period. After-tax operating income available to Arch common shareholders, a "non-GAAP measure" as defined in the SEC rules, represents net income available to Arch common shareholders, excluding net realized gains or losses, net impairment losses recognized in earnings, equity in net income or loss of investments accounted for using the equity method, net foreign exchange gains or losses and transaction costs and other, net of income taxes. Management uses Operating ROAE as a key measure of the return generated to Arch common shareholders. See "Comment on Non-GAAP Financial Measures." Our Operating ROAE was 12.0% for 2019, compared to 10.7% for 2018. The higher Operating ROAE for 2019 reflected favorable mortgage insurance market conditions, strong investment returns and a lower level of catastrophic activity.

Total Return on Investments

Total return on investments includes investment income, equity in net income or loss of investments accounted for using the equity method, net realized gains and losses 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 excluding amounts reflected in the 'other' segment, and reflects the effect of financial market conditions along with foreign currency fluctuations. Management uses total return on investments as a key measure of the return generated to Arch common shareholders on the capital held in the business, and compares the return generated by our investment portfolio against benchmark returns which we measured our portfolio against during the periods.

The following table summarizes the pre-tax total return (before investment expenses) of investment held by Arch compared to the benchmark return (both based in U.S. Dollars) against which we measured our portfolio during the periods:

	Arch Portfolio (1)	Benchmark Return
Pre-tax total return (before investment expenses):		
Year Ended December 31, 2019	7.30%	7.39%
Year Ended December 31, 2018	0.33%	-0.60%

(1) Our investment expenses were approximately 0.33% and 0.36%, respectively, of average invested assets in 2019 and 2018.

Total return for our investment portfolio was in line with the benchmark return index in 2019 and reflected strong total returns on our investment grade fixed income and equity portfolios.

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 December 31, 2019, the benchmark return index had an average credit quality of "Aa3" by Moody's, an estimated duration of 3.02 years.

The benchmark return index included weightings to the following indices:

	%
ICE BoAML 1-10 Year AAA - A U.S. Corporate Index	21.00%
ICE BoAML 1-5 Year U.S. Treasury Index	15.00
ICE BoAML 3-5 Year Fixed Rate Asset Backed Securities Index	7.00
ICE BoAML 1-10 Year U.S. Municipal Securities Index	5.00
Bloomberg Barclays CMBS Invest Grade Aaa Total Return Index	5.00
MSCI ACWI Net Total Return USD Index	5.00
Hedge Fund Research HFRX Fixed Income Credit Index	5.00
Hedge Fund Research HFRX Equal Weighted Strategies	5.00
ICE BoAML 1-10 Year BBB U.S. Corporate Index	4.00
ICE BoAML German Government 1-10 Year Index	4.00
ICE BoAML U.S. Mortgage Backed Securities Index	4.00
ICE BoAML 0-3 Month U.S. Treasury Bill Index	4.00
ICE BoAML 1-5 Year U.K. Gilt Index	3.50
ICE BoAML 5-10 Year U.S. Treasury Index	3.00
ICE BoAML 1-5 Year Australian Governments Index	3.00
ICE BoAML U.S. High Yield Constrained Index	2.50
S&P Leveraged Loan Total Return Index	2.50
ICE BoAML 1-5 Year Canada Government Index	1.00
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, net impairment losses recognized in earnings, equity in net income or loss of investments 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, 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, net impairment losses recognized in earnings, equity in net income or loss of investments accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other and loss on redemption of preferred shares in any particular period are not indicative of the performance of, or trends in, our business. Although net realized gains or losses, net impairment losses recognized in earnings, equity in net income or loss of investments 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 investments 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, net impairment losses recognized in earnings on our 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 investments 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. The loss on redemption of preferred shares related to the redemption of our Series C preferred shares in January 2018 and had no impact on shareholders' equity or cash flows. Due to these reasons, we exclude net realized gains or losses, net impairment losses recognized in earnings, equity in net income or loss of investments accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other and loss on redemption of preferred shares 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," to our consolidated financial statements in Item 8, 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 in Item 8.

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 intangible assets, 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. 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 as of December 31, 2019. Watford has its own management and board of directors that is 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 investments accounted for using the equity method, net realized gains and losses 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 on the capital held in the business, and compares the return generated by our investment portfolio against benchmark returns which we measured our portfolio against during the periods.

RESULTS OF OPERATIONS

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

	Year Ended December 31,	
	2019	2018
Net income available to Arch common shareholders	$ 1,594,707	$ 713,616
Net realized (gains) losses	(353,013)	297,755
Net impairment losses recognized in earnings	3,165	2,829
Equity in net (income) loss of investments accounted for using the equity method	(123,672)	(45,641)
Net foreign exchange (gains) losses	10,732	(59,890)
Transaction costs and other	14,444	12,377
Loss on redemption of preferred shares	—	2,710
Income tax expense (benefit) (1)	16,276	(14,566)
After-tax operating income available to Arch common shareholders	$ 1,162,639	$ 909,190
Beginning common shareholders' equity	$ 8,659,827	$ 8,324,047
Ending common shareholders' equity	10,717,371	8,659,827
Average common shareholders' equity	$ 9,688,599	$ 8,491,937
Annualized return on average common equity %	16.5	8.4
Annualized operating return on average common equity %	12.0	10.7

(1) Income tax on net realized gains or losses, net impairment losses recognized in earnings, equity in net income or loss of investments accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other and loss on redemption of preferred shares reflects the relative mix reported by jurisdiction and the varying tax rates in each jurisdiction.

Results in all periods presented reflected the impact of current insurance and reinsurance market conditions and the impact of low interest yields on our investment portfolio.

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:

	Year Ended December 31,		
	2019	2018	% Change
Gross premiums written	$ 3,907,993	$ 3,262,332	19.8
Premiums ceded	(1,266,267)	(1,050,207)	
Net premiums written	2,641,726	2,212,125	19.4
Change in unearned premiums	(244,646)	(6,464)	
Net premiums earned	2,397,080	2,205,661	8.7
Losses and loss adjustment expenses	(1,615,475)	(1,520,680)	
Acquisition expenses	(361,614)	(349,702)	
Other operating expenses	(454,770)	(364,138)	
Underwriting income (loss)	$ (34,779)	$ (28,859)	n/m

Underwriting Ratios			% Point Change
Loss ratio	67.4%	68.9%	(1.5)
Acquisition expense ratio	15.1%	15.9%	(0.8)
Other operating expense ratio	19.0%	16.5%	2.5
Combined ratio	101.5%	101.3%	0.2

The insurance segment consists of our insurance underwriting units which offer specialty product lines on a worldwide basis, as described in note 4, "Segment Information," to our consolidated financial statements in Item 8.

Premiums Written.

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

	Year Ended December 31,			
	2019		2018	
	Amount	%	Amount	%
Professional Lines	$ 534,323	20.2	$ 450,406	20.4
Programs	426,535	16.1	393,263	17.8
Property, energy, marine and aviation	368,120	13.9	219,174	9.9
Construction and national accounts	369,202	14.0	320,937	14.5
Travel, accident and health	305,170	11.6	290,401	13.1
Excess and surplus casualty	228,023	8.6	168,467	7.6
Lenders products	111,708	4.2	96,094	4.3
Other	298,645	11.3	273,383	12.4
Total	$2,641,726	100.0	$2,212,125	100.0

Net premiums written by the insurance segment were 19.4% higher in 2019 than in 2018. Approximately thirty percent of the growth in net premiums written resulted from our new businesses acquired during 2019 or new business initiatives or product lines. The remaining growth came from expansion in existing products and accounts, and rate increases across most lines of business.

Net Premiums Earned.

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

	Year Ended December 31,			
	2019		2018	
	Amount	%	Amount	%
Professional Lines	$ 499,224	20.8	$ 458,425	20.8
Programs	414,103	17.3	389,186	17.6
Property, energy, marine and aviation	298,966	12.5	205,069	9.3
Construction and national accounts	325,687	13.6	322,440	14.6
Travel, accident and health	305,085	12.7	297,147	13.5
Excess and surplus casualty	200,615	8.4	172,424	7.8
Lenders products	66,079	2.8	94,248	4.3
Other	287,321	12.0	266,722	12.1
Total	$2,397,080	100.0	$2,205,661	100.0

Losses and Loss Adjustment Expenses.

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

	Year Ended December 31,	
	2019	2018
Current year	68.1 %	70.0 %
Prior period reserve development	(0.7)%	(1.1)%
Loss ratio	67.4 %	68.9 %

Current Year Loss Ratio.

The insurance segment's current year loss ratio was 1.9 points lower in 2019 than in 2018. The 2019 loss ratio included 1.4 points of current year catastrophic event activity, primarily related to Hurricane Dorian, compared to 3.4 points in 2018, primarily related to Hurricanes Florence and Michael and the California wildfires. The balance of the change in the 2019 loss ratio resulted, in part, from changes in mix of business and the level of large attritional losses.

Prior Period Reserve Development.

The insurance segment's net favorable development was $15.8 million, or 0.7 points, for 2019, compared to $24.4 million, or 1.1 points, for 2018. See note 5, "Reserve for Losses and Loss Adjustment Expenses," to our consolidated financial statements in Item 8 for information about the insurance segment's prior year reserve development.

Underwriting Expenses.

The insurance segment's underwriting expense ratio was 34.1% in 2019, compared to 32.4% in 2018, with the increase primarily resulting from our acquisitions in 2019.

Reinsurance Segment

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

	Year Ended December 31,		
	2019	2018	% Change
Gross premiums written	$ 2,323,223	$ 1,912,522	21.5
Premiums ceded	(720,500)	(539,950)	
Net premiums written	1,602,723	1,372,572	16.8
Change in unearned premiums	(136,334)	(111,356)	
Net premiums earned	1,466,389	1,261,216	16.3
Other underwriting income (loss)	6,444	(682)	
Losses and loss adjustment expenses	(1,011,329)	(846,882)	
Acquisition expenses	(239,032)	(211,280)	
Other operating expenses	(141,484)	(133,350)	
Underwriting income	$ 80,988	$ 69,022	17.3
Underwriting Ratios			% Point Change
Loss ratio	69.0%	67.1%	1.9
Acquisition expense ratio	16.3%	16.8%	(0.5)
Other operating expense ratio	9.6%	10.6%	(1.0)
Combined ratio	94.9%	94.5%	0.4

The reinsurance segment consists of our reinsurance underwriting units which offer specialty product lines on a worldwide basis, as described in note 4, "Segment Information," to our consolidated financial statements in Item 8.

Premiums Written.

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

	Year Ended December 31,			
	2019		2018	
	Amount	%	Amount	%
Other specialty	$ 466,977	29.1	$ 507,971	37.0
Casualty	510,374	31.8	400,178	29.2
Property excluding property catastrophe	403,320	25.2	310,293	22.6
Property catastrophe	110,643	6.9	79,624	5.8
Marine and aviation	53,679	3.3	38,013	2.8
Other	57,730	3.6	36,493	2.7
Total	$ 1,602,723	100.0	$ 1,372,572	100.0

Gross premiums written by the reinsurance segment in 2019 were 21.5% higher than in 2018, while net premiums written were 16.8% higher than in 2018. The growth in gross premiums written primarily reflected new business opportunities in casualty and property lines, partially offset by a decline in other specialty business, driven by reductions in motor and agriculture business. The growth in net premiums written is less than the growth in gross premiums written because a high proportion of the property business is subject to retrocessions. Net premiums written in 2018 included a higher level of reinstatement premiums, due to 2018 catastrophic events, as well as premium adjustments on a multi-year casualty contract.

Net Premiums Earned.

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

	Year Ended December 31,			
	2019		2018	
	Amount	%	Amount	%
Other specialty	$ 478,517	32.6	$ 474,568	37.6
Casualty	429,288	29.3	347,034	27.5
Property excluding property catastrophe	362,841	24.7	287,788	22.8
Property catastrophe	90,934	6.2	75,249	6.0
Marine and aviation	48,274	3.3	39,238	3.1
Other	56,535	3.9	37,339	3.0
Total	$ 1,466,389	100.0	$ 1,261,216	100.0

Net premiums earned in 2019 were 16.3% higher than in 2018, reflecting changes in net premiums written over the previous five quarters, including the mix and type of business written.

Other Underwriting Income (Loss).

Other underwriting income in 2019 was $6.4 million, compared to other underwriting loss of $0.7 million in 2018.

Losses and Loss Adjustment Expenses.

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

	Year Ended December 31,	
	2019	2018
Current year	72.2 %	78.1 %
Prior period reserve development	(3.2)%	(11.0)%
Loss ratio	69.0 %	67.1 %

Current Year Loss Ratio.

The reinsurance segment's current year loss ratio was 5.9 points lower in 2019 than in 2018. The 2019 loss ratio included 5.7 points for current year catastrophic event activity, primarily related to Hurricane Dorian and Typhoons Hagibis and Faxai, compared to 10.1 points in 2018, primarily related to Hurricanes Florence and Michael, Typhoon Jebi and the California wildfires.The 2018 loss ratio includes the impact of a large attritional casualty loss arising from the California wildfires that increased the 2018 loss ratio by 1.7 points. The balance of the change in the 2019 current year loss ratio resulted, in part, from the effects of market conditions and changes in the mix of business.

Prior Period Reserve Development.

The reinsurance segment's net favorable development was $46.4 million, or 3.2 points, for 2019, compared to $138.5 million, or 11.0 points, for 2018, See note 5, "Reserve for Losses and Loss Adjustment Expenses," to our consolidated financial statements in Item 8 for information about the reinsurance segment's prior year reserve development.

Underwriting Expenses.

The underwriting expense ratio for the reinsurance segment was 25.9% in 2019, compared to 27.4% in 2018, reflecting growth in net premiums earned and changes in mix of business.

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 through Arch Re Bermuda to mortgage insurers on both a proportional and non-proportional basis globally; direct mortgage insurance in Europe through Arch Insurance (EU) and in Hong Kong through 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.

	Year Ended December 31,		
	2019	2018	% Change
Gross premiums written	$ 1,466,265	$ 1,360,708	7.8
Premiums ceded	(204,509)	(202,833)	
Net premiums written	1,261,756	1,157,875	9.0
Change in unearned premiums	104,584	28,361	
Net premiums earned	1,366,340	1,186,236	15.2
Other underwriting income	16,005	13,033	
Losses and loss adjustment expenses	(53,513)	(81,289)	
Acquisition expenses	(134,319)	(118,595)	
Other operating expenses	(153,092)	(142,432)	
Underwriting income	$ 1,041,421	$ 856,953	21.5
Underwriting Ratios			**% Point Change**
Loss ratio	3.9%	6.9%	(3.0)
Acquisition expense ratio	9.8%	10.0%	(0.2)
Other operating expense ratio	11.2%	12.0%	(0.8)
Combined ratio	24.9%	28.9%	(4.0)

Premiums Written.

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

	Year Ended December 31,	
	2019	2018
Net premiums written by underwriting location		
United States	$ 1,032,868	$ 948,323
Other	228,888	209,552
Total	$ 1,261,756	$ 1,157,875

Gross premiums written by the mortgage segment in 2019 were 7.8% higher than in 2018. Net premiums written for 2019 were 9.0% higher than in the 2018 period and reflected an increase in monthly premium business due to growth in insurance in force. The persistency rate of the primary portfolio of mortgage loans of Arch MI U.S. was 75.7% at December 31, 2019 compared to 81.5% at December 31, 2018. The persistency rate 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.

Net Premiums Earned.

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

	Year Ended December 31,	
	2019	2018
Net premiums earned by underwriting location		
United States	$ 1,134,849	$ 1,009,765
Other	231,491	176,471
Total	$ 1,366,340	$ 1,186,236

Net premiums earned for 2019 were 15.2% higher than in 2018. The increase in net premiums earned reflected the growth in insurance in force in the U.S. over the last twelve months combined with higher single premium earned as a result of policy terminations due to mortgage refinance activity.

Other Underwriting Income.

Other underwriting income, which is primarily related to GSE risk-sharing transactions receiving derivative accounting treatment, was $16.0 million for 2019, compared to $13.0 million for 2018.

Losses and Loss Adjustment Expenses.

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

	Year Ended December 31,	
	2019	2018
Current year	13.1 %	16.0 %
Prior period reserve development	(9.2)%	(9.1)%
Loss ratio	3.9 %	6.9 %

Unlike property and casualty business for which we estimate ultimate losses on premiums earned, losses on mortgage insurance business are only recorded at the time a borrower is delinquent on their mortgage, in accordance with primary mortgage insurance industry practice. Because our primary mortgage insurance reserving process does not take into account the impact of future losses from loans that are not delinquent, mortgage insurance loss reserves are not an estimate of ultimate losses. In addition to establishing loss reserves for delinquent loans, under GAAP, we are required to establish a premium deficiency reserve for our mortgage insurance products if the amount of expected future losses and maintenance costs exceeds expected future premiums, existing reserves and the anticipated investment income for such product. We assess the need for a premium deficiency reserve on a quarterly basis and perform a full analysis annually. No such reserve was established during 2019 and 2018.

Current Year Loss Ratio.

The mortgage segment's current year loss ratio was 2.9 points lower in 2019 compared to 2018. The current year loss ratio for 2019 reflects the current favorable macroeconomic environment as the percentage of loans in default on first lien business decreased from 1.60% at December 31, 2018 to 1.54% at December 31, 2019.

We insure mortgages for homes in areas that have been impacted by catastrophic events, including 2018 events such as Hurricanes Florence and Michael and the California wildfires. Generally, mortgage insurance losses occur only when a credit event occurs and, following a physical damage event, when the home is restored to pre-storm condition. Our ultimate claims exposure will depend on the number of delinquency notices received and the ultimate claim rate related to such notices. In the event of natural disasters, cure rates are influenced by the adequacy of homeowners and flood insurance carried on a related property, and a borrower's access to aid from government entities and private organizations, in addition to other factors which generally impact cure rates in unaffected areas.

Prior Period Reserve Development.

The mortgage segment's net favorable development was $125.2 million, or 9.2 points, for 2019, compared to $107.6 million, or 9.1 points, for 2018. See note 5, "Reserve for Losses and Loss Adjustment Expenses," to our consolidated financial statements in Item 8 for information about the mortgage segment's prior year reserve development.

Underwriting Expenses.

The underwriting expense ratio for the mortgage segment was 21.0% for 2019, compared to 22.0% for 2018. The lower ratio in the 2019 period primarily resulted from the higher level of net premiums earned.

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, net impairment losses included in earnings, equity in net income or loss of investments 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:

	Year Ended December	
	2019	2018
Fixed maturities	$ 440,824	$ 403,449
Equity securities	13,455	12,650
Short-term investments	14,642	17,802
Other (1)	86,440	70,946
Gross investment income	555,361	504,847
Investment expenses (2)	(64,294)	(66,889)
Net investment income	$ 491,067	$ 437,958

(1) Amounts include dividends and other distributions on investment funds, term loan investments, funds held balances, cash balances and other.

(2) Investment expenses were approximately 0.33% of average invested assets for 2019, compared to 0.36% for 2018.

The pre-tax investment income yield was 2.52% for 2019, compared to 2.36% for 2018. The higher level of net investment income for 2019 compared to 2018 reflected a higher level of income on fund investments and the reinvestment of fixed income securities at slightly higher available yields and the shift from municipal bonds to corporates. The pre-tax investment income yields were calculated based on amortized cost. Yields on future investment income may vary based on financial market conditions, investment allocation decisions and other factors.

Corporate Expenses.

Corporate expenses were $65.7 million for 2019, compared to $58.6 million for 2018. Such amounts primarily represent certain holding company costs necessary to support our worldwide operations and costs associated with operating as a publicly traded company. The higher level of corporate expenses in 2019 compared to 2018 was primarily due to higher incentive compensation costs.

Transaction Costs and Other.

Transaction costs and other were $14.4 million for 2019, compared to $11.4 million for 2018. Amounts for 2019 were primarily attributable to our 2019 acquisitions, while amounts for 2018 were primarily attributable to the write off of intangible assets related to insurance licenses for a subsidiary which was merged with another subsidiary.

Amortization of Intangible Assets.

Amortization of intangible assets for 2019 was $82.1 million, compared to $105.7 million for 2018 . Amounts in 2019 and 2018 primarily related to amortization of finite-lived intangible assets related to our 2016 acquisition.

Interest Expense.

Interest expense was $93.7 million for 2019, compared to $101.0 million for 2018. Interest expense reflects amounts related to our outstanding senior notes, revolving credit agreement borrowings and other. We repaid $375 million of our revolving credit agreement borrowings during 2018 resulting in lower borrowing costs for 2019.

Loss on Redemption of Preferred Shares.

In January 2018, we redeemed the remaining $92.3 million of 6.75% Series C preferred shares outstanding and recorded a loss of $2.7 million. Such adjustments had no impact on total shareholders' equity or cash flows.

Net Realized Gains (Losses).

We recorded net realized gains of $351.2 million for 2019, compared to net realized losses of $284.4 million for 2018. 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 includes realized and unrealized contract gains and losses on our derivative instruments, changes in the fair value of assets and liabilities accounted for using the fair value option along with re-measurement of contingent consideration liability amounts.

Net Impairment Losses Recognized in Earnings.

For 2019, we recorded $3.2 million of credit related impairments in earnings, compared to $2.8 million in 2018. See note 8, "Investment Information—Other-Than-Temporary Impairments," to our consolidated financial statements in Item 8 for additional information.

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

We recorded $123.7 million of equity in net income related to investments accounted for using the equity method for 2019, compared to $45.6 million for 2018. Investments accounted for using the equity method totaled $1.66 billion at December 31, 2019, compared to $1.49 billion at December 31, 2018. See note 8, "Investment Information—Equity in Net Income (Loss) of Investments Accounted For Using the Equity Method," to our consolidated financial statements in Item 8 for additional information.

Net Foreign Exchange Gains or Losses.

Net foreign exchange losses for 2019 were $9.3 million, compared to net foreign exchange gains for 2018 of $58.7 million. Amounts in such 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 before income taxes resulted in an expense of 8.7% for 2019, compared to an expense of 13.1% for 2018. Our effective tax rate fluctuates from year to year consistent with the relative mix of income or loss reported by jurisdiction and the varying tax rates in each jurisdiction.

See note 14, "Income Taxes," to our consolidated financial statements in Item 8 for a reconciliation of the difference between the provision for income taxes and the expected tax provision at the weighted average statutory tax rate for 2019 and 2018.

Other Segment

The 'other' segment includes the results of Watford. Pursuant to generally accepted accounting principles ("GAAP"), 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 as of December 31, 2019. See note

11, “Variable Interest Entity and Noncontrolling Interests,” and note 4, “Segment Information,” to our consolidated financial statements in Item 8 for additional information.

CRITICAL ACCOUNTING POLICIES, ESTIMATES AND RECENT ACCOUNTING PRONOUNCEMENTS

The preparation of consolidated financial statements in accordance with GAAP requires us to make many estimates and judgments that affect the reported amounts of assets, liabilities (including reserves), revenues and expenses, and related disclosures of contingent liabilities. On an ongoing basis, we evaluate our estimates, including those related to revenue recognition, insurance and other reserves, reinsurance recoverables, allowance for doubtful accounts, investment valuations, goodwill and intangible assets, bad debts, income taxes, contingencies and litigation. We base our estimates on historical experience, where possible, and on various other assumptions that we believe to be reasonable under the circumstances, which form the basis for our judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results will differ from these estimates and such differences may be material. We believe that the following critical accounting policies affect significant estimates used in the preparation of our consolidated financial statements.

Loss Reserves

We are required by applicable insurance laws and regulations and GAAP to establish reserves for losses and loss adjustment expenses, or Loss Reserves, that arise from the business we underwrite. Loss Reserves for our insurance, reinsurance and mortgage operations are balance sheet liabilities representing estimates of future amounts required to pay losses and loss adjustment expenses for insured or reinsured events which have occurred at or before the balance sheet date. Loss Reserves do not reflect contingency reserve allowances to account for future loss occurrences. Losses arising from future events will be estimated and recognized at the time the losses are incurred and could be substantial. See note 6, “Short Duration Contracts,” to our consolidated financial statements in Item 8 for additional information on our reserving process.

At December 31, 2019 and 2018, our Loss Reserves, net of unpaid losses and loss adjustment expenses recoverable, by type and by operating segment were as follows:

	December 31,	
	2019	2018
Insurance segment:		
Case reserves	$ 1,601,627	$ 1,489,644
IBNR reserves	3,403,051	3,266,796
Total net reserves	5,004,678	4,756,440
Reinsurance segment:		
Case reserves	1,273,523	1,082,917
Additional case reserves	166,251	191,002
IBNR reserves	1,835,993	1,578,907
Total net reserves	3,275,767	2,852,826
Mortgage segment:		
Case reserves	266,030	355,606
IBNR reserves	157,712	122,304
Total net reserves (1)	423,742	477,910
Other segment:		
Case reserves	478,036	364,052
Additional case reserves	29,059	36,512
IBNR reserves	597,910	551,266
Total net reserves	1,105,005	951,830
Total:		
Case reserves	3,619,216	3,292,219
Additional case reserves	195,310	227,514
IBNR reserves	5,994,666	5,519,273
Total net reserves	$ 9,809,192	$ 9,039,006

(1) At December 31, 2019, total net reserves include $278.7 million from U.S. primary mortgage insurance business, of which 57.8% represents policy years 2009 and prior and the remainder from later policy years. At December 31, 2018, total net reserves include $375.8 million from U.S. primary mortgage insurance business, of which 73.4% represents policy years 2009 and prior and the remainder from later policy years.

At December 31, 2019 and 2018, the insurance segment's Loss Reserves by major line of business, net of unpaid losses and loss adjustment expenses recoverable, were as follows:

	December 31, 2019	December 31, 2018
Professional lines (1)	$ 1,322,969	$ 1,247,914
Construction and national accounts	1,248,750	1,166,143
Excess and surplus casualty (2)	564,254	631,370
Programs	571,926	482,045
Property, energy, marine and aviation	371,822	388,710
Travel, accident and health	109,613	83,836
Lenders products	28,233	52,007
Other (3)	787,111	704,415
Total net reserves	$ 5,004,678	$ 4,756,440

(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.

At December 31, 2019 and 2018, the reinsurance segment's Loss Reserves by major line of business, net of unpaid losses and loss adjustment expenses recoverable, were as follows:

	December 31, 2019	December 31, 2018
Casualty (1)	$ 1,796,073	$ 1,551,550
Other specialty (2)	649,309	582,420
Property excluding property catastrophe (3)	471,775	422,612
Marine and aviation	160,930	130,683
Property catastrophe	113,565	90,635
Other (4)	84,115	74,926
Total net reserves	$ 3,275,767	$ 2,852,826

(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 facultative business.
(4) Includes life, casualty clash and other.

Potential Variability in Loss Reserves

The tables below summarize the effect of reasonably likely scenarios on the key actuarial assumptions used to estimate our Loss Reserves, net of unpaid losses and loss adjustment expenses recoverable, at December 31, 2019 by underwriting segment (excluding the 'other' segment). The scenarios shown in the tables summarize the effect of (i) changes to the expected loss ratio selections used at December 31, 2019, which represent loss ratio point increases or decreases to the expected loss ratios used, and (ii) changes to the loss development patterns used in our reserving process at December 31, 2019, which represent claims reporting that is either slower or faster than the reporting patterns used. We believe that the illustrated sensitivities are indicative of the potential variability inherent in the estimation process of those parameters. The results show the impact of varying each key actuarial assumption using the chosen sensitivity on our IBNR reserves, on a net basis and across all accident years.

INSURANCE SEGMENT	Higher Expected Loss Ratios	Slower Loss Development Patterns
Reserving lines selected assumptions:		
Property, energy, marine and aviation	5 points	3 months
Third party occurrence business	10	6
Third party claims-made business	10	6
Multi-line and other specialty	10	6
Increase (decrease) in Loss Reserves:		
Property, energy, marine and aviation	$ 16,404	$ 22,858
Third party occurrence business	257,686	139,243
Third party claims-made business	112,089	120,769
Multi-line and other specialty	126,168	121,377

INSURANCE SEGMENT	Lower Expected Loss Ratios	Faster Loss Development Patterns
Reserving lines selected assumptions:		
Property, energy, marine and aviation	(5) points	(3) months
Third party occurrence business	(10)	(6)
Third party claims-made business	(10)	(6)
Multi-line and other specialty	(10)	(6)
Increase (decrease) in Loss Reserves:		
Property, energy, marine and aviation	$ (16,331)	$ (19,345)
Third party occurrence business	(257,381)	(123,113)
Third party claims-made business	(112,060)	(98,892)
Multi-line and other specialty	(119,211)	(81,804)

REINSURANCE SEGMENT	Higher Expected Loss Ratios	Slower Loss Development Patterns
Reserving lines selected assumptions:		
Casualty	10 points	6 months
Other specialty	5	3
Property excluding property catastrophe	5	3
Property catastrophe	5	3
Marine and aviation	5	3
Other	5	3
Increase (decrease) in Loss Reserves:		
Casualty	$ 130,546	$ 154,027
Other specialty	59,901	36,615
Property excluding property catastrophe	17,308	43,876
Property catastrophe	5,113	8,885
Marine and aviation	8,462	13,641
Other	5,926	4,666

REINSURANCE SEGMENT	Lower Expected Loss Ratios	Faster Loss Development Patterns
Reserving lines selected assumptions:		
Casualty	(10) points	(6) months
Other specialty	(5)	(3)
Property excluding property catastrophe	(5)	(3)
Property catastrophe	(5)	(3)
Marine and aviation	(5)	(3)
Other	(5)	(3)
Increase (decrease) in Loss Reserves:		
Casualty	$ (130,528)	$ (117,413)
Other specialty	(59,901)	(58,314)
Property excluding property catastrophe	(17,309)	(39,376)
Property catastrophe	(5,113)	(5,723)
Marine and aviation	(8,473)	(14,715)
Other	(5,926)	(4,378)

It is not necessarily appropriate to sum the total impact for a specific factor or the total impact for a specific business category as the business categories are not perfectly correlated. In addition, the potential variability shown in the tables above are reasonably likely scenarios of changes in our key assumptions at December 31, 2019 and are not meant to be a "best case" or "worst case" series of outcomes and, therefore, it is possible that future variations may be more or less than the amounts set forth above.

For our mortgage segment, we considered the sensitivity of loss reserve estimates at December 31, 2019 by assessing the potential changes resulting from a parallel shift in severity and default to claim rate. For example, assuming all other factors remain constant, for every one percentage point change in primary claim severity (which we estimate to be 30% of the unpaid principal balance at December 31, 2019), we estimated that our loss reserves would change by approximately $14.0 million at December 31, 2019. For every one percentage point change in our primary net default to claim rate (which we estimate to be approximately 25% at December 31, 2019), we estimated a $17.0 million change in our loss reserves at December 31, 2019.

Simulation Results

In order to illustrate the potential volatility in our Loss Reserves, we used a Monte Carlo simulation approach to simulate a range of results based on various probabilities. Both the probabilities and related modeling are subject to inherent uncertainties. The simulation relies on a significant number of assumptions, such as the potential for multiple entities to react similarly to external events, and includes other statistical assumptions. The simulation results shown for each segment do not add to the total simulation results, as the individual segment simulation results do not reflect the diversification effects across our segments.

At December 31, 2019, our recorded Loss Reserves by underwriting segment, net of unpaid losses and loss adjustment expenses recoverable, and the results of the simulation were as follows:

	Insurance Segment	Reinsurance Segment	Mortgage Segment	Total
Loss Reserves (1)	$5,004,678	$3,275,767	$423,742	$8,704,187
Simulation results:				
90th percentile (2)	$6,020,835	$4,117,091	$507,130	$10,173,177
10th percentile (3)	$3,975,992	$2,548,680	$346,009	$6,777,556

(1) Net of reinsurance recoverables. Excludes amounts reflected in the 'other' segment.
(2) Simulation results indicate that a 90% probability exists that the net reserves for losses and loss adjustment expenses will not exceed the indicated amount.
(3) Simulation results indicate that a 10% probability exists that the net reserves for losses and loss adjustment expenses will be at or below the indicated amount.

For informational purposes, based on the total simulation results, a change in our Loss Reserves to the amount indicated at the 90th percentile would result in a decrease in income before income taxes of approximately $1.47 billion, or $3.55 per diluted share, while a change in our Loss Reserves to the amount indicated at the 10th percentile would result in an increase in income before income taxes of approximately $1.44 billion, or $3.47 per diluted share. The simulation results noted above are informational only, and no assurance can be given that our ultimate losses will not be significantly different than the simulation results shown above, and such differences could directly and significantly impact earnings favorably or unfavorably in the period they are determined. We do not have significant exposure to pre-2002 liabilities, such as asbestos-related illnesses and other long-tail liabilities. It is difficult to provide meaningful trend information for certain liability/ casualty coverages for which the claim-tail may be especially long, as claims are often reported and ultimately paid or settled years, or even decades, after the related loss events occur. Any estimates and assumptions made as part of the reserving process could prove to be inaccurate due to several factors, including the fact that relatively limited historical information has been reported to us through December 31, 2019.

Mortgage Operations Supplemental Information

The mortgage segment's insurance in force ("IIF") and risk in force ("RIF") were as follows at December 31, 2019 and 2018:

(U.S. Dollars in millions)	December 31,			
	2019		2018	
	Amount	%	Amount	%
Insurance In Force (IIF) (1):				
U.S. primary mortgage insurance	$ 287,150	68.7	$ 276,538	72.1
Mortgage reinsurance	26,768	6.4	25,975	6.8
Other (2)	104,346	24.9	81,147	21.2
Total	$ 418,264	100.0	$ 383,660	100.0
Risk In Force (RIF) (3):				
U.S. primary mortgage insurance	$ 73,388	91.9	$ 70,995	92.3
Mortgage reinsurance	2,129	2.7	2,217	2.9
Other (2)	4,380	5.5	3,728	4.8
Total	$ 79,897	100.0	$ 76,940	100.0

(1) Represents the aggregate dollar amount of each insured mortgage loan's current principal balance.
(2) Includes participation in GSE credit risk-sharing transactions and international insurance business.
(3) Represents the aggregate 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 December 31, 2019:

(U.S. Dollars in millions)	IIF		RIF		Delinquency
	Amount	%	Amount	%	Rate (1)
Policy year:					
2009 and prior	$ 16,903	5.9	$ 3,900	5.3	8.88%
2010	348	0.1	90	0.1	3.97%
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	$ 287,150	100.0	$ 73,388	100.0	1.54%

(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, 2018:

(U.S. Dollars in millions)	IIF		RIF		Delinquency
	Amount	%	Amount	%	Rate (1)
Policy year:					
2009 and prior	$ 21,210	7.7	$ 4,900	6.9	8.90%
2010	646	0.2	175	0.2	2.62%
2011	2,530	0.9	701	1.0	1.57%
2012	9,650	3.5	2,664	3.8	0.78%
2013	16,823	6.1	4,676	6.6	0.89%
2014	18,274	6.6	4,947	7.0	0.97%
2015	33,781	12.2	8,849	12.5	0.69%
2016	52,324	18.9	13,407	18.9	0.77%
2017	54,287	19.6	13,793	19.4	0.55%
2018	67,013	24.2	16,883	23.8	0.15%
Total	$ 276,538	100.0	$ 70,995	100.0	1.60%

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

The following tables provide supplemental disclosures on risk in force for our U.S. primary mortgage insurance business at December 31, 2019 and 2018:

(U.S. Dollars in millions)	December 31,			
	2019		2018	
	Amount	%	Amount	%
Credit quality (FICO):				
>=740	$ 42,301	57.6	$ 41,066	57.8
680-739	25,240	34.4	23,954	33.7
620-679	5,444	7.4	5,485	7.7
<620	403	0.5	490	0.7
Total	$ 73,388	100.0	$ 70,995	100.0
Weighted average FICO score	743		743	
Loan-to-Value (LTV):				
95.01% and above	$ 9,064	12.4	$ 7,918	11.2
90.01% to 95.00%	40,136	54.7	39,370	55.5
85.01% to 90.00%	20,890	28.5	20,643	29.1
85.00% and below	3,298	4.5	3,064	4.3
Total	$ 73,388	100.0	$ 70,995	100.0
Weighted average LTV	93.0%		93.0%	
Total RIF, net of external reinsurance	$ 58,512		$ 55,755	

(U.S. Dollars in millions)	December 31,			
	2019		2018	
	Amount	%	Amount	%
Total RIF by State:				
Texas	$ 5,678	7.7	$ 5,491	7.7
California	5,187	7.1	4,505	6.3
Florida	3,887	5.3	3,541	5.0
Virginia	2,881	3.9	2,931	4.1
Georgia	2,753	3.8	2,573	3.6
Illinois	2,616	3.6	2,482	3.5
Minnesota	2,514	3.4	2,400	3.4
Washington	2,474	3.4	2,408	3.4
North Carolina	2,470	3.4	2,505	3.5
Maryland	2,437	3.3	2,407	3.4
Others	40,491	55.2	39,752	56.0
Total	$ 73,388	100.0	$ 70,995	100.0

The following table provides supplemental disclosures for our U.S. primary mortgage insurance business related to insured loans and loss metrics for the years ended December 31, 2019 and 2018:

(U.S. Dollars in thousands, except loan and claim count)	Year Ended December 31,	
	2019	2018
Rollforward of insured loans in default:		
Beginning delinquent number of loans	20,665	27,068
New notices	39,017	37,310
Cures	(36,601)	(39,896)
Paid claims	(2,918)	(3,817)
Ending delinquent number of loans (1)	20,163	20,665
Ending number of policies in force (1)	1,307,884	1,289,295
Delinquency rate (1)	1.54%	1.60%
Losses:		
Number of claims paid	2,918	3,817
Total paid claims	$ 116,854	$ 159,474
Average per claim	$ 40.0	$ 41.8
Severity (2)	96.0%	102.0%
Average reserve per default (in thousands) (1)	$ 13.3	$ 17.4

(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 12.0 to 1 at December 31, 2019, compared to 13.0 to 1 at December 31, 2018.

Ceded Reinsurance

In the normal course of business, our insurance and mortgage insurance operations cede a portion of their premium on a quota share or excess of loss basis through treaty or facultative reinsurance agreements. Our reinsurance operations also obtain reinsurance whereby another reinsurer contractually agrees to indemnify it for all or a portion of the reinsurance risks underwritten by our reinsurance operations. Such arrangements, where one reinsurer provides reinsurance to another reinsurer, are usually referred to as "retrocessional reinsurance" arrangements. In addition, our reinsurance subsidiaries participate in "common account" retrocessional arrangements for certain pro rata treaties. Such arrangements reduce the effect of individual or aggregate losses to all companies participating on such treaties, including the reinsurers, such as our reinsurance operations, and the ceding company. Reinsurance recoverables are recorded as assets, predicated on the reinsurers' ability to meet their obligations under the reinsurance agreements. If the reinsurers are unable to satisfy their obligations under the agreements, our insurance or reinsurance operations would be liable for such defaulted amounts.

The availability and cost of reinsurance and retrocessional protection is subject to market conditions, which are beyond our control. Although we believe that our insurance and reinsurance operations have been successful in obtaining adequate reinsurance and retrocessional protection, it is not certain that they will be able to continue to obtain adequate protection at cost effective levels. As a result of such market conditions and other factors, our insurance, reinsurance and mortgage operations may not be able to successfully mitigate risk through reinsurance and retrocessional arrangements and may lead to increased volatility in our results of operations in future periods. See "Risk Factors—Risks Relating to Our Industry—The failure of any of the loss limitation methods we employ could have a material adverse effect on our financial condition or results of operations."

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.

For purposes of managing risk, we reinsure a portion of our exposures, paying to reinsurers a part of the premiums received on the policies we write, and we may also use retrocessional protection. On a consolidated basis, ceded premiums written represented 25.8% of gross premiums written for 2019, compared to 23.2% for 2018. We monitor the financial condition of our reinsurers and attempt to place coverages only with substantial, financially sound carriers. If the financial condition of our reinsurers or retrocessionaires deteriorates, resulting in an impairment of their ability to make payments, we will provide for probable losses resulting from our inability to collect amounts due from such parties, as appropriate. We evaluate the credit worthiness of all the reinsurers to which we cede business. If our analysis indicates that there is significant uncertainty regarding our ability to collect amounts due from reinsurers, managing general agents, brokers and other clients, we will record a provision for doubtful accounts. See "Risk Factors—Risks Relating to Our Company—We are exposed to credit risk in certain of our business operations" and "Financial Condition, Liquidity and Capital Resources" for further details.

Premium Revenues and Related Expenses

Insurance premiums written are generally recorded at the policy inception and are primarily earned on a pro rata basis over the terms of the policies for all products, usually 12 months. Premiums written include estimates in our insurance operations' programs, specialty lines, collateral protection business and for participation in involuntary pools. Such premium estimates are derived from multiple sources which include the historical experience of the underlying business, similar business and available industry information. Unearned premium reserves represent the portion of premiums written that relates to the unexpired terms of in-force insurance policies.

Reinsurance premiums written include amounts reported by brokers and ceding companies, supplemented by our own estimates of premiums where reports have not been received. The determination of premium estimates requires a review of our experience with the ceding companies, familiarity with each market, the timing of the reported information, an analysis and understanding of the characteristics of each line of business, and management's judgment of the impact of various factors, including premium or loss trends, on the volume of business written and ceded to us. On an ongoing basis, our underwriters review the amounts reported by these third parties for reasonableness based on their experience and knowledge of the subject class of business, taking into account our historical experience with the brokers or ceding companies. In addition, reinsurance contracts under which we assume business generally contain specific provisions which allow us to perform audits of the ceding company to ensure compliance with the terms and conditions of the contract, including accurate and timely reporting of information. Based on a review of all available information, management establishes premium estimates where reports have not been received. Premium estimates are updated when new information is received and differences between such estimates and actual amounts are recorded in the period in which estimates are changed or the actual amounts are determined. Premiums written are recorded based on the type of contracts we write. Premiums on our excess of loss and pro rata reinsurance contracts are estimated when the business is underwritten. For excess of loss contracts, premiums are recorded as written based on the terms of the contract. Estimates of premiums written under pro rata contracts are recorded in the period in which the underlying risks incept and are based on information provided by the brokers and the ceding companies. For multi-year reinsurance treaties which are payable in annual installments, generally, only the initial annual installment is included as premiums written at policy inception due to the ability of the reinsured to commute or cancel coverage during the term of the policy. The remaining annual installments are included as premiums written at each successive anniversary date within the multi-year term.

Reinstatement premiums for our insurance and reinsurance operations are recognized at the time a loss event occurs, where coverage limits for the remaining life of the contract are reinstated under pre-defined contract terms. Reinstatement premiums, if obligatory, are fully earned when recognized. The accrual of reinstatement premiums is based on an estimate of losses and loss adjustment expenses, which reflects management's judgment, as described above in "—Reserves for Losses and Loss Adjustment Expenses."

The amount of reinsurance premium estimates included in premiums receivable and the amount of related acquisition expenses by type of business were as follows at December 31, 2019:

	December 31, 2019		
	Gross Amount	Acquisition Expenses	Net Amount
Other specialty	$ 222,881	$ (56,628)	$ 166,253
Casualty	172,129	(53,074)	119,055
Property excluding property catastrophe	80,134	(27,316)	52,818
Marine and aviation	46,962	(12,159)	34,803
Property catastrophe	4,475	(814)	3,661
Other	64,578	(7,182)	57,396
Total	$ 591,159	$ (157,173)	$ 433,986

Premium estimates are reviewed by management at least quarterly. Such review includes a comparison of actual reported premiums to expected ultimate premiums along with a review of the aging and collection of premium estimates. Based on management's review, the appropriateness of the premium estimates is evaluated, and any adjustment to these estimates is recorded in the period in which it becomes known. Adjustments to premium estimates could be material and such adjustments could directly and significantly impact earnings favorably or unfavorably in the period they are determined because the estimated premium may be fully or substantially earned.

A significant portion of amounts included as premiums receivable, which represent estimated premiums written, net of commissions, are not currently due based on the terms of the underlying contracts. Based on currently available information, management believes that the premium estimates included in premiums receivable will be collectible and, therefore, no provision for doubtful accounts has been recorded on the premium estimates at December 31, 2019.

Reinsurance premiums assumed, irrespective of the class of business, are generally earned on a pro rata basis over the terms of the underlying policies or reinsurance contracts. Contracts and policies written on a "losses occurring" basis cover claims that may occur during the term of the contract or policy, which is typically 12 months. Accordingly, the premium is earned evenly over the term. Contracts which are written on a "risks attaching" basis cover claims which attach to the underlying insurance policies written during the terms of such contracts. Premiums earned on such contracts usually extend beyond the original term of the reinsurance contract, typically resulting in recognition of premiums earned over a 24-month period.

Certain of our reinsurance contracts include provisions that adjust premiums or acquisition expenses based upon the experience under the contracts. Premiums written and earned, as well as related acquisition expenses, are recorded based upon the projected experience under such contracts.

Retroactive reinsurance reimburses a ceding company for liabilities incurred as a result of past insurable events covered by the underlying policies reinsured. In certain instances, reinsurance contracts cover losses both on a prospective basis and on a retroactive basis and, accordingly, we bifurcate the prospective and retrospective elements of these reinsurance contracts and accounts for each element separately where practical. Underwriting income generated in connection with retroactive reinsurance contracts is deferred and amortized into income over the settlement period while losses are charged to income immediately. Subsequent changes in estimated amount or timing of cash flows under such retroactive reinsurance contracts are accounted for by adjusting the previously deferred amount to the balance that would have existed had the revised estimate been available at the inception of the reinsurance transaction, with a corresponding charge or credit to income.

Mortgage guaranty insurance policies are contracts that are generally non-cancelable by the insurer, are renewable at a fixed price, and provide for payment of premiums on a monthly, annual or single basis. Upon renewal, we are not able to re-underwrite or re-price our policies. Consistent with industry accounting practices, premiums written on a monthly basis are earned as coverage is provided. Premiums written on an annual basis are amortized on a monthly pro rata basis over the year of coverage. Primary mortgage insurance premiums written on policies covering more than one year are referred to as single premiums. A portion of the revenue from single premiums is recognized in premiums earned in the current period, and the remaining portion is deferred as unearned premiums and earned over the estimated expiration of risk of the policy. If single premium policies related to insured loans are canceled for any reason and the policy is a non-refundable product, the remaining unearned premium related to each canceled policy is recognized as earned premium upon notification of the cancellation.

Unearned premiums represent the portion of premiums written that is applicable to the estimated unexpired risk of insured loans. A portion of premium payments may be refundable if the insured cancels coverage, which generally occurs when the loan is repaid, the loan amortizes to a sufficiently low amount to trigger a lender permitted or legally required cancellation, or the value of the property has increased sufficiently in accordance with the terms of the contract. Premium refunds reduce premiums earned in the consolidated statements of income. Generally, only unearned premiums are refundable.

Acquisition costs that are directly related and incremental to the successful acquisition or renewal of business are deferred and amortized based on the type of contract. For property and casualty insurance and reinsurance contracts, deferred acquisition costs are amortized over the period in which the related premiums are earned. Consistent with mortgage insurance industry accounting practice, amortization of acquisition costs related to the mortgage insurance contracts for each underwriting year's book of business is recorded in proportion to estimated gross profits. Estimated gross profits are comprised of earned premiums and losses and loss adjustment expenses. For each underwriting year, we estimate the rate of amortization to reflect actual experience and any changes to persistency or loss development.

Acquisition expenses and other expenses related to our underwriting operations that vary with, and are directly related to, the successful acquisition or renewal of business are deferred and amortized based on the type of contract. Our insurance and reinsurance operations capitalize incremental direct external costs that result from acquiring a contract but do not capitalize salaries, benefits and other internal underwriting costs. For our mortgage insurance operations, which include a substantial direct sales force, both external and certain internal direct costs are deferred and amortized. Deferred acquisition costs are carried at their estimated realizable value and take into account anticipated losses and loss adjustment expenses, based on historical and current experience, and anticipated investment income.

A premium deficiency occurs if the sum of anticipated losses and loss adjustment expenses, unamortized acquisition costs and maintenance costs and anticipated investment income exceed unearned premiums. A premium deficiency reserve ("PDR") is recorded by charging any unamortized acquisition costs to expense to the extent required in order to eliminate the deficiency. If the premium deficiency exceeds unamortized acquisition costs then a liability is accrued for the excess deficiency.

To assess the need for a PDR on our mortgage exposures, we develop loss projections based on modeled loan defaults related to our current policies in force. This projection is based on recent trends in default experience, severity and rates of defaulted loans moving to claim, as well as recent trends in the rate at which loans are prepaid, and incorporates anticipated interest income. Evaluating the expected profitability of our existing mortgage insurance business and the need for a PDR for our mortgage business involves significant reliance upon assumptions and estimates with regard to the likelihood, magnitude and timing of potential losses and premium revenues. The models, assumptions and estimates we use to evaluate the need for a PDR may prove to be inaccurate, especially during an extended economic downturn or a period of extreme market volatility and uncertainty.

No premium deficiency charges were recorded by us during 2019 and 2018.

Fair Value Measurements

We review our securities measured at fair value and discuss the proper classification of such investments with investment advisors and others. See note 9, "Fair Value," to our consolidated financial statements in Item 8 for a summary of our financial assets and liabilities measured at fair value at December 31, 2019 by valuation hierarchy.

Reclassifications

We have reclassified the presentation of certain prior year information to conform to the current presentation. Such reclassifications had no effect on our net income, shareholders' equity or cash flows.

Significant Accounting Pronouncements

For all other significant accounting policies see note 3, "Significant Accounting Policies" and note 3-(r), "Recent Accounting Pronouncements" to our consolidated financial statements in Item 8 for disclosures concerning our companies significant accounting policies and recent accounting pronouncements.

FINANCIAL CONDITION

Investable Assets

At December 31, 2019, total investable assets held by Arch were $22.29 billion, excluding the $2.70 billion included in the 'other' segment (*i.e.*, attributable to Watford).

Investable Assets Held by Arch

The Finance, Investment and Risk Committee ("FIR") of our board of directors establishes our investment policies and sets the parameters for creating guidelines for our investment managers. The FIR reviews the implementation of the investment strategy on a regular basis. Our current approach stresses preservation of capital, market liquidity and diversification of risk. While maintaining our emphasis on preservation of capital and liquidity, we expect our portfolio to become more diversified and, as a result, we may expand into areas which are not currently part of our investment strategy. Our Chief Investment Officer administers the investment portfolio, oversees our investment managers and formulates investment strategy in conjunction with the FIR.

The following table summarizes the fair value of investable assets held by Arch (*i.e.*, excluding the 'other' segment):

Investable assets (1):	Estimated Fair Value	% of Total
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	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%	
December 31, 2018		
Fixed maturities (2)	$ 14,881,902	76.1
Short-term investments (2)	995,926	5.1
Cash	583,027	3.0
Equity securities (2)	368,843	1.9
Other investments	1,261,525	6.4
Investments accounted for using the equity method	1,493,791	7.6
Securities transactions entered into but not settled at the balance sheet date	(18,153)	(0.1)
Total investable assets held by Arch	$ 19,566,861	100.0
Average effective duration (in years)	3.38	
Average S&P/Moody's credit ratings (3)	AA/Aa2	
Embedded book yield (4)	2.89%	

(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 as available for sale, at fair value and 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 December 31, 2019, approximately $15.80 billion, or 71%, of total investable assets held by Arch were internally managed, compared to $14.08 billion, or 72%, at December 31, 2018.

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

	Estimated Fair Value	% of Total
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
December 31, 2018		
Corporate bonds	$ 5,735,526	38.5
Mortgage backed securities	535,763	3.6
Municipal bonds	1,012,308	6.8
Commercial mortgage backed securities	729,442	4.9
U.S. government and government agencies	3,601,269	24.2
Non-U.S. government securities	1,713,891	11.5
Asset backed securities	1,553,703	10.4
Total	$ 14,881,902	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
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
December 31, 2018		
U.S. government and gov't agencies (1)	$ 4,194,676	28.2
AAA	3,551,039	23.9
AA	2,129,336	14.3
A	3,069,656	20.6
BBB	1,251,205	8.4
BB	275,201	1.8
B	183,614	1.2
Lower than B	61,271	0.4
Not rated	165,904	1.1
Total	$ 14,881,902	100.0

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

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
December 31, 2019			
0-10%	$ 4,329,484	$ (51,023)	95.5
10-20%	12,405	(1,796)	3.4
20-30%	830	(273)	0.5
Greater than 30%	315	(363)	0.7
Total	$ 4,343,034	$ (53,455)	100.0
December 31, 2018			
0-10%	$ 8,722,837	$ (190,170)	92.5
10-20%	87,188	(13,012)	6.3
20-30%	3,359	(1,058)	0.5
Greater than 30%	2,363	(1,266)	0.6
Total	$ 8,815,747	$ (205,506)	100.0

The following table summarizes our top ten exposures to fixed income corporate issuers by fair value at December 31, 2019, excluding guaranteed amounts and covered bonds:

	Estimated Fair Value	Credit Rating (1)
Bank of America Corporation	$ 272,554	A-/A2
Apple Inc.	202,082	AA+/Aa1
Citigroup Inc.	198,996	A/A1
JPMorgan Chase & Co.	198,863	A-/A2
Wells Fargo & Company	197,376	A-/A1
Morgan Stanley	144,345	BBB+/A3
HSBC Holdings plc	135,564	A/A2
BP p.l.c.	115,446	A-/A1
Nestlé S.A.	115,138	AA-/Aa3
The Goldman Sachs Group, Inc.	114,798	BBB+/A3
Total	$ 1,695,162	

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

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

	Agencies	Investment Grade	Below Investment Grade	Total
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
Dec. 31, 2018				
RMBS	$ 488,862	$ 15,410	$ 31,491	$ 535,763
CMBS	104,547	602,865	22,030	729,442
ABS	—	1,485,150	68,553	1,553,703
Total	$ 593,409	$ 2,103,425	$ 122,074	$ 2,818,908

At December 31, 2019, our investment portfolio included $827.8 million of equity securities, compared to $368.8 million at December 31, 2018. Our equity portfolio includes publicly traded common stocks in the natural resources, energy, consumer staples and other sectors.

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

	December 31, 2019	December 31, 2018
Term loan investments	264,083	281,635
Lending	602,841	524,112
Credit related funds	123,020	152,361
Energy	97,402	117,509
Investment grade fixed income	151,594	101,902
Infrastructure	61,786	45,371
Private equity	18,915	24,383
Real estate	17,279	14,252
Total fair value option	$ 1,336,920	$ 1,261,525

The following table summarizes our investments accounted for using the equity method, by strategy:

	December 31, 2019	December 31, 2018
Credit related funds	$ 428,437	$ 429,402
Equities	293,686	375,273
Real estate	246,851	232,647
Lending	202,690	125,041
Private equity	144,983	114,019
Infrastructure	235,033	113,748
Energy	108,716	103,661
Total	$ 1,660,396	$ 1,493,791

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 10, "Derivative Instruments," to our consolidated financial statements in Item 8 for additional disclosures concerning 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 9, "Fair Value," to our consolidated financial statements in Item 8 for a summary of our financial assets and liabilities measured at fair value at December 31, 2019 and 2018 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 their investment policies and guidelines.

The following table summarizes investable assets in the 'other' segment:

	December 31, 2019	December 31, 2018
Investments accounted for using the fair value option:		
Other investments	$ 1,092,396	$ 1,050,414
Fixed maturities	416,592	922,819
Short-term investments	329,303	282,131
Equity securities	59,799	56,638
Total	1,898,090	2,344,208
Fixed maturities available for sale, at fair value	706,875	393,351
Equity securities	65,337	32,206
Cash	102,437	63,529
Securities sold but not yet purchased	(66,257)	(7,790)
Securities transactions entered into but not settled at the balance sheet date	(1,893)	(35,635)
Total investable assets included in 'other' segment	$ 2,704,589	$ 2,757,663

Reinsurance Recoverables

At December 31, 2019 and 2018, approximately 61.2% and 63.0% of reinsurance recoverables on paid and unpaid losses (not including ceded unearned premiums) of $4.35 billion and $2.92 billion, respectively, were due from carriers which had an A.M. Best rating of "A-" or better while 38.8% and 37.0%, 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 December 31, 2019 and 2018. The largest reinsurance recoverables from any one carrier was approximately 1.7% and 2.7%, respectively, of total shareholders' equity available to Arch at December 31, 2019 and 2018.

The following table details our reinsurance recoverables at December 31, 2019:

	% of Total	A.M. Best Rating (1)
Lloyd's syndicates (2)	8.0	A
Everest Reinsurance Company	4.4	A+
Hannover Rück SE	4.2	A+
Swiss Reinsurance America Corporation	3.6	A+
AXA XL	3.2	A+
Partner Reinsurance Company of the U.S.	3.0	A+
Munich Reinsurance America, Inc.	3.0	A+
Berkley Insurance Company	2.2	A+
Transatlantic Reinsurance Company	2.2	A+
Liberty Mutual Insurance Company	2.1	A
Renaissance Reinsurance	1.4	A+
All other -- fully collateralized reinsurers (3)	13.5	NR
All other -- "A-" or better	23.9	
All other -- not rated (4)	25.3	
Total	100.0	

(1) The financial strength ratings are as of February 17, 2020 and were assigned by A.M. Best based on its opinion of the insurer's financial strength as of such date. An explanation of the ratings listed in the table follows: the rating of "A+" is designated "Superior"; and the "A" rating is designated "Excellent."
(2) The A.M. Best group rating of "A" (Excellent) has been applied to all Lloyd's syndicates.
(3) Such amount is fully collateralized through reinsurance trusts.
(4) Over 90% of such amount is collateralized through reinsurance trusts or letters of credit.

Reserves for Losses and Loss Adjustment Expenses

We establish reserves for losses and LAE (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. See "Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies, Estimates and Recent Accounting Pronouncements—Loss Reserves" and see Item 1"Business—Reserves" for further details.

Shareholders' Equity and Book Value per Share

Total shareholders' equity available to Arch was $11.50 billion at December 31, 2019, compared to $9.44 billion at December 31, 2018. The increase in 2019 was primarily attributable to underwriting, strong investment returns and a lower level of catastrophic activity.

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

(U.S. dollars in thousands, except share data)	December 31, 2019	December 31, 2018
Total shareholders' equity available to Arch	$ 11,497,371	$ 9,439,827
Less preferred shareholders' equity	780,000	780,000
Common shareholders' equity available to Arch	$ 10,717,371	$ 8,659,827
Common shares and common share equivalents outstanding, net of treasury shares (1)	405,619,201	402,454,834
Book value per share	$ 26.42	$ 21.52

(1) Excludes the effects of 18,853,018 and 20,076,593 stock options and 1,586,779 and 1,307,304 restricted stock and performance units outstanding at December 31, 2019 and 2018, respectively.

LIQUIDITY

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.

In 2019, Arch Capital received dividends of $116.9 million from Arch Re Bermuda, our Bermuda-based reinsurer and insurer which can pay approximately $3.1 billion to Arch Capital in 2020 without providing an affidavit to the Bermuda Monetary Authority ("BMA"). Arch-U.S. received $465.0 million of dividends from Arch U.S. MI Holdings Inc., a subsidiary of Arch-U.S.

Our insurance and reinsurance operations provide liquidity in that premiums are received in advance, sometimes substantially in advance, of the time losses are paid. The period of time from the occurrence of a claim through the settlement of the liability may extend many years into the future. Sources of liquidity include cash flows from operations, financing arrangements or routine sales of investments.

As part of our investment strategy, we seek to establish a level of cash and highly liquid short-term and intermediate-term securities which, combined with expected cash flow, is believed by us to be adequate to meet our foreseeable payment obligations. However, due to the nature of our operations, cash flows are affected by claim payments that may comprise large payments on a limited number of claims and which can fluctuate from year to year. We believe that our liquid investments and cash flow will provide us with sufficient liquidity in order to meet our claim payment obligations. However, the timing and amounts of actual claim payments related to recorded Loss Reserves vary based on many factors, including large individual losses, changes in the legal environment, as well as general market conditions. The ultimate amount of the claim payments could differ materially from our estimated amounts. Certain lines of business written by us, such as excess casualty, have loss experience characterized as low frequency and high severity. The foregoing may result in significant variability in loss payment patterns. The impact of this variability can be exacerbated by the fact that the timing of the receipt of reinsurance recoverables owed to us may be slower than anticipated by us. Therefore, the irregular timing of claim payments can create significant variations in cash flows from operations between periods and may require us to utilize other sources of liquidity to make these payments, which may include the sale of investments or utilization of existing or new credit facilities or capital market transactions. If the source of liquidity is the sale of investments, we may be forced to sell such investments at a loss, which may be material.

We expect that our liquidity needs, including our anticipated insurance obligations and operating and capital expenditure needs, for the next twelve months, at a minimum, 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.

Dividend Restrictions

Arch Capital has no material restrictions on its ability to make distributions to shareholders. However, the ability of our regulated insurance and reinsurance subsidiaries to pay dividends or make distributions or other payments to us is limited by the applicable local laws and relevant regulations of the various countries and states in which we operate. See note 24, "Statutory Information," to our consolidated financial statements in Item 8 for additional information on dividend restrictions.

The payment of dividends from Arch Re Bermuda is, under certain circumstances, limited under Bermuda law, which requires our Bermuda operating subsidiary to maintain certain measures of solvency and liquidity.

Our U.S. insurance and reinsurance subsidiaries are subject to insurance laws and regulations in the jurisdictions in which they operate. The ability of our regulated insurance subsidiaries to pay dividends or make distributions is dependent on their ability to meet applicable regulatory standards. These regulations include restrictions that limit the amount of dividends or other distributions, such as loans or cash advances, available to shareholders without prior approval of the insurance regulatory authorities. Each state requires prior regulatory approval of any payment of extraordinary dividends.

We also have insurance subsidiaries that are the parent company for other insurance subsidiaries, which means that dividends and other distributions will be subject to multiple layers of regulations in order for our insurance subsidiaries to be able to dividend funds to Arch Capital. The inability of the subsidiaries of Arch Capital to pay dividends and other permitted distributions could have a material adverse effect on Arch Capital's cash requirements and our ability to make principal, interest and dividend payments on the senior notes, preferred shares and common shares.

In addition to meeting applicable regulatory standards, the ability of our insurance and reinsurance subsidiaries to pay dividends is also constrained by our dependence on the financial strength ratings of our insurance and reinsurance subsidiaries from independent rating agencies. The ratings from these agencies depend to a large extent on the capitalization levels of our insurance and reinsurance subsidiaries. We believe that Arch Capital has sufficient cash resources and available dividend capacity to service its indebtedness and other current outstanding obligations.

Restricted Assets

Our insurance, reinsurance and mortgage insurance subsidiaries are required to maintain assets on deposit, which primarily consist of fixed maturities, with various regulatory authorities to support their operations. The assets on deposit are available to settle insurance and reinsurance liabilities to third parties. Our insurance and reinsurance subsidiaries maintain assets in trust accounts as collateral for insurance and reinsurance transactions with affiliated companies and also have investments in segregated portfolios primarily to provide collateral or guarantees for letters of credit to third parties. At December 31, 2019 and 2018, such amounts approximated $6.80 billion and $6.76 billion, respectively, excluding amounts related to the ‘other’ segment.

Our investments in certain securities, including certain fixed income and structured securities, investments in funds accounted for using the equity method, other alternative investments and investments in ventures such as Watford and others may be illiquid due to contractual provisions or investment market conditions. If we require significant amounts of cash on short notice in excess of anticipated cash requirements, then we may have difficulty selling these investments in a timely manner or may be forced to sell or terminate them at unfavorable values. Our unfunded investment commitments totaled approximately $1.69 billion at December 31, 2019 and are callable by our investment managers. The timing of the funding of investment commitments is uncertain and may require us to access cash on short notice.

Cash Flows

The following table summarizes our cash flows from operating, investing and financing activities, excluding amounts related to the ‘other’ segment:

	Year Ended December	
	2019	2018
Total cash provided by (used for):		
Operating activities	$ 1,810,060	$ 1,331,278
Investing activities	(1,689,640)	(268,734)
Financing activities	3,663	(987,679)
Effects of exchange rate changes on foreign currency cash	16,063	(16,383)
Increase (decrease) in cash	$ 140,146	$ 58,482

- Cash provided by operating activities for 2019 was higher than in 2018, primarily reflecting an increase in premiums collected, a lower level of net losses paid and lower purchases of tax and loss bonds. The 2018 period reflected a higher level of paid losses and purchases of tax and loss bonds.

- Cash used for investing activities for 2019 was higher than in 2018, reflecting a higher level of securities purchased.

- Cash provided by financing activities for 2019 was higher than the cash used in 2018. The 2018 period reflected $375.0 million of paydowns on our revolving credit agreement borrowings, $282.8 million of repurchases under our share repurchase program and $92.6 million related to redemption of our Series C preferred shares.

Investments

At December 31, 2019, our investable assets were $22.29 billion, excluding the $2.70 billion of investable assets related to the ‘other’ segment. The primary goals of our asset liability management process are to satisfy the insurance liabilities, manage the interest rate risk embedded in those insurance liabilities and maintain sufficient liquidity to cover fluctuations in projected liability cash flows, including debt service obligations. Generally, the expected principal and interest payments produced by our fixed income portfolio adequately fund the estimated runoff of our insurance reserves. Although this is not an exact cash flow match in each period, the substantial degree by which the fair value of the fixed income portfolio exceeds the expected present value of the net insurance liabilities, as well as the positive cash flow from newly sold policies and the large amount of high quality liquid bonds, provide assurance of our ability to fund the payment of claims and to service our outstanding debt without having to sell securities at distressed prices or access credit facilities. Please refer to Item 1A “Risk Factors” for a discussion of other risks relating to our business and investment portfolio.

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)	December 31, 2019	December 31, 2018
Debt:		
Senior notes, due May 2034	$ 300,000	$ 300,000
Arch-U.S. senior notes, due Nov 2043 (1)	500,000	500,000
Arch Finance senior notes, due Dec 2026 (1)	500,000	500,000
Arch Finance senior notes, due Dec 2046 (1)	450,000	450,000
Deferred debt issuance costs on senior notes	(15,791)	(16,472)
Revolving credit agreement borrowings due Oct 2021 (2)	—	—
Total	$ 1,734,209	$ 1,733,528
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	10,717,371	8,659,827
Total	$11,497,371	$ 9,439,827
Total capital available to Arch	$13,231,580	$11,173,355
Senior notes to total capital (%)	13.1	15.5
Revolving credit agreement borrowings to total capital (%)	—	—
Debt to total capital (%)	13.1	15.5
Preferred to total capital (%)	5.9	7.0
Debt and preferred to total capital (%)	19.0	22.5

(1) Fully and unconditionally guaranteed by Arch Capital.
(2) $500 million unsecured facility for revolving loans and letters of credit.

Arch Capital and Arch-U.S. are each holding companies and, accordingly, they conduct substantially all of their operations through their operating subsidiaries. Arch Capital Finance LLC ("Arch Finance") is a wholly owned subsidiary of Arch U.S. MI Holdings Inc., a U.S. holding company. As a result, Arch Capital, Arch-U.S. and Arch Finance's cash flows and their ability to service their debt depends upon the earnings of their operating subsidiaries and on their ability to distribute the earnings, loans or other payments from such subsidiaries to Arch Capital, Arch-U.S. and Arch Finance, respectively.

See note 18, "Debt and Financing Arrangements," to our consolidated financial statements in Item 8 for additional disclosures concerning our senior notes and revolving credit agreement borrowings. For additional information on our preferred shares, see note 20, "Shareholders' Equity," to our consolidated financial statements in Item 8.

During 2019 and 2018, we made interest payments of $98.7 million and $100.1 million respectively, related to our senior notes and other financing arrangements.

In November 2017, Arch Capital, Arch-U.S. and Arch Finance filed a universal shelf registration statement with the SEC. This registration statement allows for the possible future offer and sale by us of various types of securities, including unsecured debt securities, preference shares, common shares, warrants, share purchase contracts and units and depositary shares. The shelf registration statement enables us to efficiently access the public debt and/or equity capital markets in order to meet our future capital needs. The shelf registration statement also allows selling shareholders to resell common shares that they own in one or more offerings from time to time. We will not receive any proceeds from any shares offered by the selling shareholders.

Capital Adequacy

We monitor our capital adequacy on a regular basis and will seek to adjust our capital base (up or down) according to the needs of our business. The future capital requirements of our business will depend on many factors, including our ability to write new business successfully and to establish premium rates and reserves at levels sufficient to cover losses. Our ability to underwrite is largely dependent upon the quality of our claims paying and financial strength ratings as evaluated by independent rating agencies. In particular, we require (1) sufficient capital to maintain our financial strength ratings, as issued by several ratings agencies, at a level considered necessary by management to enable our key operating subsidiaries to compete; (2) sufficient capital to enable our underwriting subsidiaries to meet the capital adequacy tests performed by statutory agencies in the U.S. and other key markets; and (3) our non-U.S. operating companies are required to post letters of credit and other forms of collateral that are necessary for them to operate as they are "non-admitted" under U.S. state insurance regulations.

In addition, Arch MI U.S. is required to maintain compliance with the GSEs requirements, known as 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 December 31, 2019 with a PMIER sufficiency ratio of 161%, compared to 141% at December 31, 2018.

As part of our capital management program, we may seek to raise additional capital or may seek to return capital to our shareholders through share repurchases, cash dividends or other methods (or a combination of such methods). Any such determination will be at the discretion of our board of directors and will be dependent upon our profits, financial requirements and other factors, including legal restrictions, rating agency requirements and such other factors as our board of directors deems relevant.

To the extent that our existing capital is insufficient to fund our future operating requirements or maintain such ratings, we may need to raise additional funds through financings or limit our growth. We can provide no assurance that, if needed, we would be able to obtain additional funds through financing on satisfactory terms or at all. Any adverse developments in the financial markets, such as disruptions, uncertainty or volatility in the capital and credit markets, may result in realized and unrealized capital losses that could have a material adverse effect on our results of operations, financial position and our businesses, and may also limit our access to capital required to operate our business. In addition to common share capital, we depend on external sources of finance to support our underwriting activities, which can be in the form (or any combination) of debt securities, preference shares, common equity and bank credit facilities providing loans and/or letters of credit.

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 U.S.-based 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. As a result, the level of subject business ceded to Arch Re Bermuda was substantially lower beginning in 2018 than in prior periods. In 2019, certain reinsurance agreements between our insurance and reinsurance subsidiaries were reinstated.

Except as described in the above paragraph, or where express reinsurance, guarantee or other financial support contractual arrangements are in place, each of Arch Capital's subsidiaries or affiliates is solely responsible for its own liabilities and commitments (and no other Arch Capital subsidiary or affiliate is so responsible). Any reinsurance arrangements, guarantees or other financial support contractual arrangements that are in place are solely for the benefit of the Arch Capital subsidiary or affiliate involved and third parties (creditors or insureds of such entity) are not express beneficiaries of such arrangements.

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. Since the inception of the share repurchase program through December 31, 2019, Arch Capital has repurchased approximately 386.3 million common shares for an aggregate purchase price of $3.97 billion. At December 31, 2019, $1.0 billion of share repurchases were available under the program. Repurchases under the program 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.

CONTRACTUAL OBLIGATIONS AND COMMITMENTS

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.

Contractual Obligations

The following table provides an analysis of our contractual commitments at December 31, 2019:

	Payment due by period				
	Total	2020	2021 and 2022	2023 and 2024	Thereafter
Operating activities					
Estimated gross payments for losses and loss adjustment expenses (1)	$ 12,628,213	$ 3,612,298	$ 3,818,635	$ 1,901,186	$ 3,296,094
Deposit accounting liabilities (2)	10,431	3,814	668	822	5,127
Contractholder payables (3)	2,119,460	671,838	729,706	297,634	420,282
Operating lease obligations	170,453	31,907	58,439	39,940	40,167
Purchase obligations	55,606	29,861	20,082	4,753	910
Investing activities					
Unfunded investment commitments (4)	1,686,649	1,686,649	—	—	—
Financing activities					
Securities lending payable (5)	388,366	388,366	—	—	—
Senior notes (including interest payments)	3,435,288	90,465	180,929	180,929	2,982,965
Financing lease obligations	6,883	4,822	2,061	—	—
Total contractual obligations and commitments	$ 20,501,349	$ 6,520,020	$ 4,810,520	$ 2,425,264	$ 6,745,545

(1) The estimated expected contractual commitments related to the reserves for losses and loss adjustment expenses are presented on a gross basis (*i.e.*, not reflecting any corresponding reinsurance recoverable amounts that would be due to us). It should be noted that until a claim has been presented to us, determined to be valid, quantified and settled, there is no known obligation on an individual transaction basis, and while estimable in the aggregate, the timing and amount contain significant uncertainty.

(2) The estimated expected contractual commitments related to deposit accounting liabilities have been estimated using projected cash flows from the underlying contracts. It should be noted that, due to the nature of such liabilities, the timing and amount contain significant uncertainty.

(3) Certain insurance policies written by our insurance operations feature large deductibles, primarily in construction and national accounts lines. Under such contracts, we are obligated to pay the claimant for the full amount of the claim and are subsequently reimbursed by the policyholder for the deductible amount. In the event we are unable to collect from the policyholder, we would be liable for such defaulted amounts.

(4) Unfunded investment commitments are callable by our investment managers. We have assumed that such investments will be funded in the next year but the funding may occur over a longer period of time, due to market conditions and other factors.

(5) As part of our securities lending program, we loan securities to third parties and receive collateral in the form of cash or securities. Such collateral is due back to the third parties at the close of the securities lending transactions, a majority of which is overnight and continuous by nature.

Letter of Credit and Revolving Credit Facilities

In the normal course of its operations, the Company enters into agreements with financial institutions to obtain secured and unsecured credit facilities.

On December 17, 2019 Arch Capital and certain of its subsidiaries entered into an $750.0 million five-year credit facility (the "Credit Facility") with a syndication of lenders. The Credit Facility consists of a $250.0 million secured facility for letters of credit (the "Secured Facility") and a $500.0 million unsecured facility for revolving loans and letters of credit (the "Unsecured Facility"). Obligations of each borrower under the Secured Facility for letters of credit are secured by cash and eligible securities of such borrower held in collateral accounts. Commitments under the Credit Facility may be increased up to, but not exceeding, an aggregate of $1.25 billion.

Arch Capital has a one-time option to convert any or all outstanding revolving loans of Arch Capital and/or Arch-U.S. to term loans with the same terms as the revolving loans except that any prepayments may not be re-borrowed. Arch-U.S. guarantees the obligations of Arch Capital, and Arch Capital guarantees the obligations of Arch-U.S. Borrowings of revolving loans may be made at a variable rate based on LIBOR or an alternative base rate at the option of Arch Capital. Secured letters of credit are available for issuance on behalf of Arch Capital insurance and reinsurance subsidiaries. The Credit Facility is structured such that each party that requests a letter of credit or borrowing does so only for itself and for only its own obligations.

The Credit Facility contains certain restrictive covenants customary for facilities of this type, including restrictions on indebtedness, consolidated tangible net worth, minimum shareholders' equity levels and minimum financial strength ratings. Arch Capital and its subsidiaries which are party to the agreement were in compliance with all covenants contained therein at December 31, 2019.

Under the $250.0 million secured letter of credit facility, Arch Capital's subsidiaries had $225.4 million of letters of credit outstanding and remaining capacity of $24.6 million at December 31, 2019. In addition, certain of Arch Capital's subsidiaries had outstanding secured and unsecured letters of credit of $18.1 million and $195.0 million respectively, which were issued in the normal course of business. There were no outstanding revolving credit agreement borrowings at December 31, 2019 and 2018.

RATINGS

Our ability to underwrite business is affected by the quality of our claims paying ability and financial strength ratings as evaluated by independent agencies. Such ratings from third party internationally recognized statistical rating organizations or agencies are instrumental in establishing the financial security of companies in our industry. We believe that the primary users of such ratings include commercial and investment banks, policyholders, brokers, ceding companies and investors. Insurance ratings are also used by insurance and reinsurance intermediaries as an important means of assessing the financial strength and quality of insurers and reinsurers, and are often an important factor in the decision by an insured or intermediary of whether to place business with a particular insurance or reinsurance provider. Periodically, rating agencies evaluate us to confirm that we continue to meet their criteria for the ratings assigned to us by them. S&P, Moody's, A.M. Best Company and Fitch Ratings are ratings agencies which have assigned financial strength ratings to one or more of Arch Capital's subsidiaries.

If we are not able to obtain adequate capital, our business, results of operations and financial condition could be adversely affected, which could include, among other things, the following possible outcomes: (1) potential downgrades in the financial strength ratings assigned by ratings agencies to our operating subsidiaries, which could place those operating subsidiaries at a competitive disadvantage compared to higher-rated competitors; (2) reductions in the amount of business that our operating subsidiaries are able to write in order to meet capital adequacy-based tests enforced by statutory agencies; and (3) any resultant ratings downgrades could, among other things, affect our ability to write business and increase the cost of bank credit and letters of credit. In addition, under certain of the reinsurance agreements assumed by our reinsurance operations, upon the occurrence of a ratings downgrade or other specified triggering event with respect to our reinsurance operations, such as a reduction in surplus by specified amounts during specified periods, our ceding company clients may be provided with certain rights, including, among other things, the right to terminate the subject reinsurance agreement and/or to require that our reinsurance operations post additional collateral.

The ratings issued on our companies by these agencies are announced publicly and are available directly from the agencies. Our Internet site (*www.ir.archcapgroup.com*, under Credit Ratings) contains information about our ratings, but such information on our website is not incorporated by reference into this report.

CATASTROPHIC EVENTS AND SEVERE ECONOMIC EVENTS

We have large aggregate exposures to natural and man-made catastrophic events 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.

We have substantial exposure to unexpected, large losses resulting from future man-made catastrophic events, such as acts of war, acts of terrorism and political instability. These risks are inherently unpredictable. It is difficult to predict the timing of such events with statistical certainty or estimate the amount of loss any given occurrence will generate. It is not possible to completely eliminate our exposure to unforecasted or unpredictable events and, to the extent that losses from such risks occur, our financial condition and results of operations could be materially adversely affected. Therefore, claims for natural and man-made catastrophic events could expose us to large losses and cause substantial volatility in our results of operations, which could cause the value of our common shares to fluctuate widely. In certain instances, we specifically insure and reinsure risks resulting from terrorism. Even in cases where we attempt to exclude losses from terrorism and certain other similar risks from some coverages written by us, we may not be successful in doing so. Moreover, irrespective of the clarity and inclusiveness of policy language, there can be no assurance that a court or arbitration panel will limit enforceability of policy language or otherwise issue a ruling adverse to us.

We seek to limit our loss exposure by writing a number of our reinsurance contracts on an excess of loss basis, adhering to maximum limitations on reinsurance written in defined geographical zones, limiting program size for each client and prudent underwriting of each program written. In the case of proportional treaties, we may seek per occurrence limitations or loss ratio caps to limit the impact of losses from any one or series of events. In our insurance operations, we seek to limit our exposure through the purchase of reinsurance. We cannot be certain that any of these loss limitation methods will be effective. We also seek to limit our loss exposure by geographic diversification. Geographic zone limitations involve significant underwriting judgments, including the determination of the area of the zones and the inclusion of a particular policy within a particular zone's limits. There can be no assurance that various provisions of our policies, such as limitations or exclusions from coverage or choice of forum, will be enforceable in the manner we intend. Disputes relating to coverage and choice of legal forum may also arise. Underwriting is inherently a matter of judgment, involving important assumptions about matters that are inherently unpredictable and beyond our control, and for which historical experience and probability analysis may not provide sufficient guidance. One or more catastrophic or other events could result in claims that substantially exceed our expectations, which could have a material adverse effect on our financial condition or our results of operations, possibly to the extent of eliminating our shareholders' equity.

For our natural catastrophe exposed business, we seek to limit the amount of exposure we will assume from any one insured or reinsured and the amount of the exposure to catastrophe losses from a single event in any geographic zone. We monitor our exposure to catastrophic events, including earthquake and wind and periodically reevaluate the estimated probable maximum pre-tax loss for such exposures. Our estimated probable maximum pre-tax loss is determined through the use of modeling techniques, but such estimate does not represent our total potential loss for such exposures.

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 total shareholders' equity available to Arch. We reserve the right to change this threshold at any time.

Based on in-force exposure estimated as of January 1, 2020, our modeled peak zone catastrophe exposure is a windstorm affecting the Florida Tri-County, with a net probable maximum pre-tax loss of $612 million, followed by windstorms affecting Northeastern U.S. and the Gulf of Mexico with net probable maximum pre-tax losses of $544 million and $521 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 in both periods. As of January 1, 2020, our modeled peak zone earthquake exposure (San Francisco area earthquake) represented approximately 70% 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.

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 total 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 January 1, 2020, our modeled RDS loss was 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 total shareholders' equity or 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 —Risk Relating to Our Industry." Depending on business opportunities and the mix of business that may comprise our insurance, reinsurance and mortgage portfolios, we may seek to adjust our self-imposed limitations on probable maximum pre-tax loss for catastrophe exposed business and mortgage default exposed business. See "—Critical Accounting Policies, Estimates and Recent Accounting Pronouncements—Ceded Reinsurance" for a discussion of our catastrophe reinsurance programs.

OFF-BALANCE SHEET ARRANGEMENTS

We have entered into various aggregate excess of loss reinsurance agreements with various special purpose reinsurance companies domiciled in Bermuda. These are special purpose variable interest entities that are not consolidated in our financial results because we do not have the unilateral power to direct those activities that are significant to its economic performance. As of December 31, 2019, our estimated off-balance sheet maximum exposure to loss from such entities was $42.1 million. See note 11, "Variable Interest Entity and Noncontrolling Interests," to our consolidated financial statements in Item 8 for additional information.

MARKET SENSITIVE INSTRUMENTS AND RISK MANAGEMENT

Our investment results are subject to a variety of risks, including risks related to changes in the business, financial condition or results of operations of the entities in which we invest, as well as changes in general economic conditions and overall market conditions. We are also exposed to potential loss from various market risks, including changes in equity prices, interest rates and foreign currency exchange rates.

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 December 31, 2019. Market risk represents the risk of changes in the fair value of a financial instrument and consists of several components, including liquidity, basis and price risks.

The sensitivity analysis performed as of December 31, 2019 presents hypothetical losses in cash flows, earnings and fair values of market sensitive instruments which were held by us on December 31, 2019 and are sensitive to changes in interest rates and equity security prices. This risk management discussion and the estimated amounts generated from the following sensitivity analysis represent forward-looking statements of market risk assuming certain adverse market conditions occur. Actual results in the future may differ materially from these projected results due to actual developments in the global financial markets. The analysis methods used by us to assess and mitigate risk should not be considered projections of future events of losses.

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 the reinsurance transactions.

The focus of the SEC's market risk rules is on price risk. For purposes of specific risk analysis, we employ 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. The financial instruments included in the following sensitivity analysis consist of all of our investments and cash.

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 market 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 market 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 investment portfolio at December 31, 2019 and 2018:

(U.S. dollars in billions)	Interest Rate Shift in Basis Points				
	-100	-50	-	+50	+100
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)
Dec. 31, 2018					
Total fair value	$ 19.23	$ 18.91	$ 18.62	$ 18.30	$ 17.98
Change from base	3.3%	1.6%		(1.7)%	(3.4)%
Change in unrealized value	$ 0.61	$ 0.30		$ (0.32)	$ (0.63)

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 investments accounted for using the equity method which invest in fixed income securities and the corresponding change in unrealized appreciation. As credit spreads widen, the fair value of our fixed income securities falls, and the converse is also true.

The following table summarizes the effect that an immediate, parallel shift in credit spreads in a static interest rate environment would have had on the portfolio at December 31, 2019 and 2018:

(U.S. dollars in billions)	Credit Spread Shift in Percentage				
	-100	-50	-	+50	+100
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)
Dec. 31, 2018					
Total fair value	$ 19.08	$ 18.84	$ 18.62	$18.39	$18.15
Change from base	2.5%	1.2%		(1.2)%	(2.5)%
Change in unrealized value	$ 0.47	$ 0.22		$ (0.22)	$ (0.47)

Another method that attempts to measure portfolio risk is Value-at-Risk ("VaR"). VaR attempts to take into account a broad cross-section of risks facing a portfolio by utilizing relevant securities volatility data skewed towards the most recent months and quarters. VaR measures the amount of a portfolio at risk for outcomes 1.65 standard deviations from the mean based on normal market conditions over a one year time horizon and is expressed as a percentage of the portfolio's initial value. In other words, 95% of the time, should the risks taken into account in the VaR model perform per their historical tendencies, the portfolio's loss in any one year period is expected to be less than or equal to the calculated VaR, stated as a percentage of the measured portfolio's initial value. As of December 31, 2019, our portfolio's VaR was estimated to be 2.80%, compared to an estimated 3.02% at December 31, 2018.

Equity Securities, Privately Held Securities and Other Investments. Our investment portfolio includes an allocation to equity securities, privately held securities and certain other investments. At December 31, 2019 and 2018, the fair value of our investments in equity securities, privately held securities and certain other investments totaled $827.8 million and $368.8 million, respectively. These securities are exposed to price risk, which is the potential loss arising from decreases in fair value. An immediate hypothetical 10% depreciation in the value of each position would reduce the fair value of such investments by approximately $82.8 million and $36.9 million at December 31, 2019 and 2018, respectively, and would have decreased book value per share by approximately $0.20 and $0.09, respectively.

Investment-Related Derivatives. At December 31, 2019, 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 $8.04 billion, compared to $4.95 billion at December 31, 2018. If the underlying exposure of each investment-related derivative held at December 31, 2019 depreciated by 100 basis points, it would have resulted in a reduction in net income of approximately $80.4 million, and a decrease in book value per share of $0.20, compared to $49.5 million and $0.12, respectively, on investment-related derivatives held at December 31, 2018. If the underlying exposure of each investment-related derivative held at December 31, 2019 appreciated by 100 basis points, it would have resulted in an increase in net income of approximately $80.4 million, and an increase in book value per share of $0.20, compared to $49.5 million and $0.12, respectively, on investment-related derivatives held at December 31, 2018. See note 10, "Derivative Instruments," to our consolidated financial statements in Item 8 for additional disclosures concerning derivatives.

For further discussion on investment activity, please refer to "—Financial Condition, Liquidity and Capital Resources—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 10, "Derivative Instruments," to our consolidated financial statements in Item 8 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)	December 31, 2019	December 31, 2018
Net assets (liabilities), denominated in foreign currencies, excluding shareholders' equity and derivatives	$ 265,501	$ (561,311)
Shareholders' equity denominated in foreign currencies (1)	744,690	478,678
Net foreign currency forward contracts outstanding (2)	81,731	241,442
Net exposures denominated in foreign currencies	$ 1,091,922	$ 158,809
Pre-tax impact of a hypothetical 10% appreciation of the U.S. Dollar against foreign currencies:		
Shareholders' equity	$ (109,192)	$ (15,881)
Book value per share	$ (0.27)	$ (0.04)
Pre-tax impact of a hypothetical 10% decline of the U.S. Dollar against foreign currencies:		
Shareholders' equity	$ 109,192	$ 15,881
Book value per share	$ 0.27	$ 0.04

(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 the Company generally attempts to match the currency of its projected liabilities with investments in the same currencies, from time to time the Company may elect to over or underweight one or more currencies, which could increase the Company's exposure to foreign currency fluctuations and increase the volatility of the Company's 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 reserves for losses and loss adjustment expenses and interest rates. The potential exists, after a catastrophe loss, 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.

ITEM 7A. 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 Operation," which information is hereby incorporated by reference.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Report of Independent Registered Public Accounting Firm

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

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Arch Capital Group Ltd. and its subsidiaries (the "Company") as of December 31, 2019 and 2018, and the related consolidated statements of income, of comprehensive income, of changes in shareholders' equity, and of cash flows for each of the three years in the period ended December 31, 2019, including the related notes and financial statement schedules listed in the index appearing under Item 15(a)(2) (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018**,** and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the 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 audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

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

Definition and Limitations of Internal Control over Financial Reporting

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

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

Critical Audit Matters

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

Valuation of Reserve for Losses and Loss Adjustment Expenses

As described in Notes 3, 5 and 6 to the consolidated financial statements, the reserve for losses and loss adjustment expenses represents estimates of future amounts required to pay losses and loss adjustment expenses for insured or reinsured events which have occurred at or before the balance sheet date. As of December 31, 2019, the Company's total reserve for losses and loss adjustment expenses was $13.9 billion. For the insurance and reinsurance segments, management estimates ultimate losses and loss adjustment expenses using various generally accepted actuarial methods applied to known losses and other relevant information. Ultimate losses and loss adjustment expenses are generally determined by extrapolation of claim emergence and settlement patterns observed in the past that can reasonably be expected to persist into the future. Management makes a number of key assumptions in their reserving process, including estimating loss development patterns and expected loss ratios. For the mortgage segment, the lead actuarial methodology used by management is a frequency-severity method based on the inventory of pending delinquencies. The assumptions of frequency and severity reflect judgments based on historical data and experience.

The principal considerations for our determination that performing procedures relating to the valuation of the reserve for losses and loss adjustment expenses is a critical audit matter are (i) there was significant judgment by management when developing their estimate, which in turn led to a high degree of auditor subjectivity and judgment in performing procedures relating to the valuation of the reserve for losses and loss adjustment expenses, (ii) there was significant auditor effort and judgment in evaluating audit evidence relating to the aforementioned key actuarial methods and key assumptions, and (iii) the audit effort included the involvement of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the valuation of the reserve for losses and loss adjustment expenses, including controls over the selection of key actuarial methods and development of key assumptions. These procedures also included, among others, the involvement of professionals with specialized skill and knowledge to assist in performing one or a combination of procedures, including (i) developing an independent estimate, on a test basis, of the reserve for losses and loss adjustment expenses, and comparing the independent estimate to management's actuarially determined reserve for losses and loss adjustment expenses to evaluate the reasonableness of the reserve for losses and loss adjustment expenses and (ii) evaluating the appropriateness of the actuarial methods and reasonableness of the assumptions, including loss development patterns, expected loss ratios, frequency, and severity used by management to determine the Company's reserve for losses and loss adjustment expenses. Developing the independent estimate and evaluating the appropriateness of the key methods and reasonableness of the key assumptions related to loss development patterns, expected loss ratios, frequency and severity, as applicable, involved testing the completeness and accuracy of historical data provided by management.

/s/ PricewaterhouseCoopers LLP

New York, New York
February 28, 2020

We have served as the Company's or its predecessor's auditor since 1995.

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

	December 31, 2019	December 31, 2018
Assets		
Investments:		
Fixed maturities available for sale, at fair value (amortized cost: $16,598,808 and $14,829,902)	$ 16,894,526	$ 14,699,010
Short-term investments available for sale, at fair value (amortized cost: $957,283 and $956,238)	956,546	955,880
Collateral received under securities lending, at fair value (amortized cost: $388,366 and $274,125)	388,376	274,133
Equity securities, at fair value	838,925	338,899
Investments accounted for using the fair value option	3,663,477	3,983,571
Investments accounted for using the equity method	1,660,396	1,493,791
Total investments	24,402,246	21,745,284
Cash	726,230	646,556
Accrued investment income	117,937	114,641
Securities pledged under securities lending, at fair value (amortized cost: $378,738 and $266,786)	379,868	268,395
Premiums receivable	1,778,717	1,299,150
Reinsurance recoverable on unpaid and paid losses and loss adjustment expenses	4,346,816	2,919,372
Contractholder receivables	2,119,460	2,079,111
Ceded unearned premiums	1,234,683	975,469
Deferred acquisition costs	633,400	569,574
Receivable for securities sold	24,133	36,246
Goodwill and intangible assets	738,083	634,920
Other assets	1,383,788	929,611
Total assets	$ 37,885,361	$ 32,218,329
Liabilities		
Reserve for losses and loss adjustment expenses	$ 13,891,842	$ 11,853,297
Unearned premiums	4,339,549	3,753,636
Reinsurance balances payable	667,072	393,107
Contractholder payables	2,119,460	2,079,111
Collateral held for insured obligations	206,698	236,630
Senior notes	1,871,626	1,733,528
Revolving credit agreement borrowings	484,287	455,682
Securities lending payable	388,366	274,125
Payable for securities purchased	87,579	90,034
Other liabilities	1,513,330	911,500
Total liabilities	25,569,809	21,780,650
Commitments and Contingencies		
Redeemable noncontrolling interests	55,404	206,292
Shareholders' Equity		
Non-cumulative preferred shares	780,000	780,000
Common shares ($0.0011 par, shares issued: 574,617,195 and 570,737,283)	638	634
Additional paid-in capital	1,889,683	1,793,781
Retained earnings	11,021,006	9,426,299
Accumulated other comprehensive income (loss), net of deferred income tax	212,091	(178,720)
Common shares held in treasury, at cost (shares: 168,997,994 and 168,282,449)	(2,406,047)	(2,382,167)
Total shareholders' equity available to Arch	11,497,371	9,439,827
Non-redeemable noncontrolling interests	762,777	791,560
Total shareholders' equity	12,260,148	10,231,387
Total liabilities, noncontrolling interests and shareholders' equity	$ 37,885,361	$ 32,218,329

See Notes to Consolidated Financial Statements

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

	Year Ended December 31,		
	2019	2018	2017
Revenues			
Net premiums written	$ 6,039,067	$ 5,346,747	$ 4,961,373
Change in unearned premiums	(252,569)	(114,772)	(116,841)
Net premiums earned	5,786,498	5,231,975	4,844,532
Net investment income	627,738	563,633	470,872
Net realized gains (losses)	366,363	(405,344)	149,141
Other-than-temporary impairment losses	(3,165)	(2,829)	(7,138)
Other underwriting income	24,861	15,073	30,253
Equity in net income of investments accounted for using the equity method	123,672	45,641	142,286
Other income (loss)	2,233	2,419	(2,571)
Total revenues	6,928,200	5,450,568	5,627,375
Expenses			
Losses and loss adjustment expenses	3,133,452	2,890,106	2,967,446
Acquisition expenses	840,945	805,135	775,458
Other operating expenses	800,997	677,809	684,451
Corporate expenses	80,111	78,994	83,752
Amortization of intangible assets	82,104	105,670	125,778
Interest expense	120,872	120,484	117,431
Net foreign exchange losses (gains)	20,609	(69,402)	115,782
Total expenses	5,079,090	4,608,796	4,870,098
Income before income taxes	1,849,110	841,772	757,277
Income taxes:			
Current tax expense (benefit)	144,361	85,863	(45,736)
Deferred tax expense (benefit)	11,449	28,088	173,304
Income tax expense	155,810	113,951	127,568
Net income	$ 1,693,300	$ 727,821	$ 629,709
Net (income) loss attributable to noncontrolling interests	(56,981)	30,150	(10,431)
Net income available to Arch	1,636,319	757,971	619,278
Preferred dividends	(41,612)	(41,645)	(46,041)
Loss on redemption of preferred shares	—	(2,710)	(6,735)
Net income available to Arch common shareholders	$ 1,594,707	$ 713,616	$ 566,502
Net income per common share and common share equivalent			
Basic	$ 3.97	$ 1.76	$ 1.40
Diluted	$ 3.87	$ 1.73	$ 1.36
Weighted average common shares and common share equivalents outstanding			
Basic	401,802,815	404,347,621	404,138,364
Diluted	411,609,478	412,906,478	417,785,025

See Notes to Consolidated Financial Statements

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

	Year Ended December 31,		
	2019	2018	2017
Comprehensive Income			
Net income	$ 1,693,300	$ 727,821	$ 629,709
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 year	500,771	(270,057)	252,904
Reclassification of net realized gains, included in net income	(118,941)	144,573	(67,863)
Foreign currency translation adjustments	18,110	(24,830)	47,014
Comprehensive income	2,093,240	577,507	861,764
Net (income) loss attributable to noncontrolling interests	(56,981)	30,150	(10,431)
Other comprehensive (income) loss attributable to noncontrolling interests	(9,130)	3,346	530
Comprehensive income available to Arch	$ 2,027,129	$ 611,003	$ 851,863

See Notes to Consolidated Financial Statements

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

	Year Ended December 31,		
	2019	2018	2017
Non-cumulative preferred shares			
Balance at beginning of year	$ 780,000	$ 872,555	$ 772,555
Preferred shares issued	—	—	330,000
Preferred shares redeemed	—	(92,555)	(230,000)
Balance at end of year	780,000	780,000	872,555
Convertible non-voting common equivalent preferred shares			
Balance at beginning of year	—	489,627	1,101,304
Preferred shares converted to common shares	—	(489,627)	(611,677)
Balance at end of year	—	—	489,627
Common shares			
Balance at beginning of year	634	611	582
Common shares issued, net	4	23	29
Balance at end of year	638	634	611
Additional paid-in capital			
Balance at beginning of year	1,793,781	1,230,617	531,687
Preferred shares converted to common shares	—	489,608	611,653
Other changes	95,902	73,556	87,277
Balance at end of year	1,889,683	1,793,781	1,230,617
Retained earnings			
Balance at beginning of year	9,426,299	8,562,889	7,996,701
Cumulative effect of an accounting change	—	149,794	(314)
Balance at beginning of year, as adjusted	9,426,299	8,712,683	7,996,387
Net income	1,693,300	727,821	629,709
Net (income) loss attributable to noncontrolling interests	(56,981)	30,150	(10,431)
Preferred share dividends	(41,612)	(41,645)	(46,041)
Loss on redemption of preferred shares	—	(2,710)	(6,735)
Balance at end of year	11,021,006	9,426,299	8,562,889
Accumulated other comprehensive income (loss)			
Balance at beginning of year	(178,720)	118,044	(114,541)
Unrealized appreciation (decline) in value of available-for-sale investments, net of deferred income tax:			
Balance at beginning of year	(114,178)	157,400	(27,641)
Cumulative effect of an accounting change	—	(149,794)	—
Balance at beginning of year, as adjusted	(114,178)	7,606	(27,641)
Unrealized holding gains (losses) during period, net of reclassification adjustment	381,830	(125,484)	185,041
Unrealized holding gains (losses) during period attributable to noncontrolling interests	(9,166)	3,700	—
Balance at end of year	258,486	(114,178)	157,400
Foreign currency translation adjustments, net of deferred income tax:			
Balance at beginning of year	(64,542)	(39,356)	(86,900)
Foreign currency translation adjustments	18,110	(24,830)	47,014
Foreign currency translation adjustments attributable to noncontrolling interests	37	(356)	530
Balance at end of year	(46,395)	(64,542)	(39,356)
Balance at end of year	212,091	(178,720)	118,044
Common shares held in treasury, at cost			
Balance at beginning of year	(2,382,167)	(2,077,741)	(2,034,570)
Shares repurchased for treasury	(23,880)	(304,426)	(43,171)
Balance at end of year	(2,406,047)	(2,382,167)	(2,077,741)
Total shareholders’ equity available to Arch	11,497,371	9,439,827	9,196,602
Non-redeemable noncontrolling interests	762,777	791,560	843,411
Total shareholders’ equity	$ 12,260,148	$ 10,231,387	$ 10,040,013

See Notes to Consolidated Financial Statements

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

	Year Ended December 31,		
	2019	2018	2017
Operating Activities			
Net income	$ 1,693,300	$ 727,821	$ 629,709
Adjustments to reconcile net income to net cash provided by operating activities:			
Net realized (gains) losses	(381,132)	387,550	(174,517)
Net impairment losses recognized in earnings	3,165	2,829	7,138
Equity in net income or loss of investments accounted for using the equity method and other income or loss	(14,013)	36,694	(79,540)
Amortization of intangible assets	82,104	105,670	125,778
Share-based compensation	66,417	55,776	67,798
Changes in:			
Reserve for losses and loss adjustment expenses, net of unpaid losses and loss adjustment expenses recoverable	489,981	243,734	614,534
Unearned premiums, net of ceded unearned premiums	252,569	114,772	116,841
Premiums receivable	(237,752)	(211,296)	(31,405)
Deferred acquisition costs	(47,260)	(37,847)	(78,378)
Reinsurance balances payable	182,132	73,438	8,529
Other items, net	(41,052)	60,181	(111,609)
Net cash provided by operating activities	2,048,459	1,559,322	1,094,878
Investing Activities			
Purchases of fixed maturity investments	(30,053,777)	(33,327,660)	(36,806,913)
Purchases of equity securities	(811,967)	(1,001,149)	(1,021,016)
Purchases of other investments	(1,470,545)	(2,014,622)	(2,020,624)
Proceeds from sales of fixed maturity investments	28,595,865	31,513,271	35,686,779
Proceeds from sales of equity securities	429,818	1,118,445	1,056,401
Proceeds from sales, redemptions and maturities of other investments	1,209,559	1,561,958	1,528,617
Proceeds from redemptions and maturities of fixed maturity investments	643,265	892,755	907,417
Net settlements of derivative instruments	59,982	44,699	(28,563)
Net (purchases) sales of short-term investments	39,833	485,473	(734,554)
Change in cash collateral related to securities lending	(62,193)	180,883	12,540
Purchases of fixed assets	(37,837)	(29,809)	(22,841)
Other	(348,486)	21,736	90,875
Net cash provided by (used for) investing activities	(1,806,483)	(554,020)	(1,351,882)
Financing Activities			
Proceeds from issuance of preferred shares, net	—	—	319,694
Redemption of preferred shares	—	(92,555)	(230,000)
Purchases of common shares under share repurchase program	(2,871)	(282,762)	—
Proceeds from common shares issued, net	6,203	(7,608)	(21,048)
Proceeds from borrowings	200,083	218,259	253,415
Repayments of borrowings	(49,182)	(576,401)	(197,000)
Change in cash collateral related to securities lending	62,193	(180,883)	(12,540)
Change in third party investment in non-redeemable noncontrolling interests	(75,056)	—	—
Change in third party investment in redeemable noncontrolling interests	(161,882)	—	—
Dividends paid to redeemable noncontrolling interests	(12,515)	(17,989)	(17,989)
Other	(6,023)	(7,226)	(51,896)
Preferred dividends paid	(41,612)	(41,645)	(46,041)
Net cash provided by (used for) financing activities	(80,662)	(988,810)	(3,405)
Effects of exchange rate changes on foreign currency cash and restricted cash	17,741	(19,133)	18,124
Increase (decrease) in cash and restricted cash	179,055	(2,641)	(242,285)
Cash and restricted cash, beginning of year	724,643	727,284	969,569
Cash and restricted cash, end of year	$ 903,698	$ 724,643	$ 727,284
Income taxes paid (received)	$ 109,463	$ (980)	$ 51,781
Interest paid	$ 126,945	$ 119,775	$ 117,374

See Notes to Consolidated Financial Statements

1. 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. Similarly, "Common Shares" means the common shares of Arch Capital. The Company's consolidated financial statements include the results of Watford Holdings Ltd., and its wholly owned subsidiaries ("Watford"). See note 11, "Variable Interest Entity and Noncontrolling Interests".

2. Business Acquired

Barbican Group Holdings Limited

On November 29, 2019, the Company closed the acquisition of Barbican Group Holdings Limited and its subsidiaries ("Barbican"), including Barbican Managing Agency Limited ("BMAL"), Lloyd's Syndicate 1955 ("Barbican Syndicate 1955"), Castel Underwriting Agencies Limited ("Castel") and other associated entities.

The Ardonagh Group

On January 1, 2019, the Company's U.K. insurance operations entered into a transaction with The Ardonagh Group to acquire renewal rights for a U.K. commercial lines book of business, consisting of commercial property, casualty, motor, professional liability, personal accident and travel business.

McNeil

On December 6, 2018, the Company closed the acquisition of McNeil & Co. ("McNeil"), a nationwide leader in specialized risk management and insurance programs headquartered in Cortland, New York.

Arch MI Asia Limited

On July 1, 2017, the Company closed the acquisition of AIG United Guaranty Insurance (Asia) Limited (renamed "Arch MI Asia Limited") following the payment of $40.0 million to American International Group, Inc. ("AIG"). Arch MI Asia Limited compliments the Company's existing private mortgage insurance businesses, which have operations in the United States, Europe and Australia.

3. Significant Accounting Policies

(a) Basis of Presentation

The consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America ("GAAP") and include the accounts of Arch Capital and its subsidiaries, including Arch Reinsurance Ltd. ("Arch Re Bermuda"), Arch Reinsurance Company ("Arch Re U.S."), Arch-U.S., Arch Insurance Company, Arch Specialty Insurance Company, Arch Excess & Surplus Insurance Company, Arch Indemnity Insurance Company, Arch Insurance Canada Ltd. ("Arch Insurance Canada"), Arch Reinsurance Europe Underwriting Designated Activity Company ("Arch Re Europe"), Arch Mortgage Insurance Company, Arch Mortgage Guaranty Company, United Guaranty Residential Insurance Company, Arch Insurance (EU) Designated Activity Company (formerly, Arch Mortgage Insurance Designated Activity Company) ("Arch Insurance (EU)"), Arch Insurance (UK) Limited (formerly Arch Insurance Company (Europe) Limited) ("Arch Insurance (U.K.)"), Lloyd's of London syndicate 2012 and related companies ("Arch Syndicate 2012"), Barbican and Watford. 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. The Company's principal estimates include:

- The reserve for losses and loss adjustment expenses;
- Reinsurance recoverable on unpaid and paid losses and loss adjustment expenses, including the provision for uncollectible amounts;
- Estimates of written and earned premiums;
- The valuation of the investment portfolio and assessment of other-than-temporary impairments ("OTTI");
- The valuation of purchased intangible assets;
- The assessment of goodwill and intangible assets for impairment; and
- the valuation of deferred tax assets.

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, shareholders' equity or cash flows.

In 2018, the shareholders approved a three-for-one stock split of the Company's common shares. All historical share and per share amounts reflect the effect of the stock split.

(b) Premium Revenues and Related Expenses

Insurance. Insurance premiums written are generally recorded at the policy inception and are primarily earned on a pro rata basis over the terms of the policies for all products, usually 12 months. Premiums written include estimates in the Company's programs, specialty lines, lenders products business and for participation in involuntary pools. Such premium estimates are derived from multiple sources which include the historical experience of the underlying business, similar business and available industry information. Unearned premium reserves represent the portion of premiums written that relates to the unexpired terms of in-force insurance policies.

Reinsurance. Reinsurance premiums written include amounts reported by brokers and ceding companies, supplemented by the Company's own estimates of premiums where reports have not been received. The determination of premium estimates requires a review of the Company's experience with the ceding companies, familiarity with each market, the timing of the reported information, an analysis and understanding of the characteristics of each line of business, and management's judgment of the impact of various factors, including premium or loss trends, on the volume of business written and ceded to the Company. On an ongoing basis, the Company's underwriters review the amounts reported by these third parties for reasonableness based on their experience and knowledge of the subject class of business, taking into account the Company's historical experience with the brokers or ceding companies. In addition, reinsurance contracts under which the Company assumes business generally contain specific provisions which allow the Company to perform audits of the ceding company to ensure compliance with the terms and conditions of the contract, including accurate and timely reporting of information. Based on a review of all available information, management establishes premium estimates where reports have not been received. Premium estimates are updated when new information is received and differences between such estimates and actual amounts are recorded in the period in which estimates are changed or the actual amounts are determined.

Reinsurance premiums written are recorded based on the type of contracts the Company writes. Premiums on the Company's excess of loss and pro rata reinsurance contracts are estimated when the business is underwritten. For excess of loss contracts, premiums are recorded as written based on the terms of the contract. Estimates of premiums written under pro rata contracts are recorded in the period in which the underlying risks are expected to incept and are based on information provided by the brokers and the ceding companies. For multi-year reinsurance treaties which are payable in annual installments, generally, only the initial annual installment is included as premiums written at policy inception due to the ability of the reinsured to commute or cancel coverage during the term of the policy. The remaining annual installments are included as premiums written at each successive anniversary date within the multi-year term.

Reinstatement premiums for the Company's insurance and reinsurance operations are recognized at the time a loss event occurs, where coverage limits for the remaining life of the contract are reinstated under pre-defined contract terms. Reinstatement premiums, if obligatory, are fully earned when recognized. The accrual of reinstatement premiums is based on an estimate of losses and loss adjustment expenses, which reflects management's judgment.

Premium estimates are reviewed by management at least quarterly. Such review includes a comparison of actual reported premiums to expected ultimate premiums along with a review of the aging and collection of premium estimates. Based on management's review, the appropriateness of the premium estimates is evaluated, and any adjustment to these estimates is recorded in the period in which it becomes known. Adjustments to premium estimates could be material and such adjustments could directly and significantly impact earnings favorably or unfavorably in the period they are determined because the estimated premium may be fully or substantially earned. A significant portion of amounts included as premiums receivable, which represent estimated premiums written, net of commissions, are not currently due based on the terms of the underlying contracts.

Reinsurance 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. Contracts and policies written on a "losses occurring" basis cover claims that may occur during the term of the contract or policy, which is typically 12 months. Accordingly, the premium is earned evenly over the term. Contracts which are written on a "risks attaching" basis cover claims which attach to the underlying insurance policies written during the terms of such contracts. Premiums earned on such contracts usually extend beyond the original term of the reinsurance contract, typically resulting in recognition of premiums earned over a 24-month period. Certain of the Company's reinsurance contracts include provisions that adjust premiums or acquisition expenses based upon the experience under the contracts. Premiums written and earned, as well as related acquisition expenses, are recorded based upon the projected experience under such contracts.

The Company also writes certain reinsurance business that is intended to provide insurers with risk management solutions that complement traditional reinsurance. Under these contracts, the Company assumes a measured amount of insurance risk in exchange for an anticipated margin, which is typically lower than on traditional reinsurance contracts. The terms and conditions of these contracts may include additional or return premiums based on loss experience, loss corridors, sublimits and caps. Examples of such business include aggregate stop-loss coverages, financial quota share coverages and multi-year retrospectively rated excess of loss coverages. If these contracts are deemed to transfer risk, they are accounted for as reinsurance. Otherwise, such contracts are accounted for under the deposit method.

Mortgage. Mortgage guaranty insurance policies are contracts that are generally non-cancelable by the insurer, are renewable at a fixed price, and provide for payment of premiums on a monthly, annual or single basis. Upon renewal, the Company is not able to re-underwrite or re-price its policies. Consistent with industry accounting practices, premiums written on a monthly basis are earned as coverage is provided. Premiums written on an annual basis are amortized on a monthly pro rata basis over the year of coverage. Primary mortgage insurance premiums written on policies covering more than one year are referred to as single premiums. A portion of the revenue from single premiums is recognized in premiums earned in the current period, and the remaining portion is deferred as unearned premiums and earned over the estimated expiration of risk of the policy. If single premium policies related to insured loans are canceled due to repayment by the borrower and the policy is a non-refundable product, the remaining unearned premium related to each canceled policy is recognized as earned premium upon notification of the cancellation.

Unearned premiums represent the portion of premiums written that is applicable to the estimated unexpired risk of insured loans. A portion of premium payments may be refundable if the insured cancels coverage, which generally occurs when the loan is repaid, the loan amortizes to a sufficiently low amount to trigger a lender permitted or legally required cancellation, or the value of the property has increased sufficiently in accordance with the terms of the contract. Premium refunds reduce premiums earned in the consolidated statements of income. Generally, only unearned premiums are refundable.

Acquisition Costs. Acquisition costs that are directly related and incremental to the successful acquisition or renewal of business are deferred and amortized based on the type of contract. The Company's insurance and reinsurance operations capitalize incremental direct external costs that result from acquiring a contract but do not capitalize salaries, benefits and other internal underwriting costs. For the Company's mortgage insurance operations, which include a substantial direct sales force, both external and certain internal direct costs are deferred and amortized. For property and casualty insurance and reinsurance contracts, deferred acquisition costs are amortized over the period in which the related premiums are earned. Consistent with mortgage insurance industry accounting practice, amortization of acquisition costs related to the mortgage insurance contracts for each underwriting year's book of business is recorded in proportion to estimated gross profits. Estimated gross profits are comprised of earned premiums and losses and loss adjustment expenses. For each underwriting year, the Company estimates the rate of amortization to reflect actual experience and any changes to persistency or loss development.

Deferred acquisition costs are carried at their estimated realizable value and take into account anticipated losses and loss adjustment expenses, based on historical and current experience, and anticipated investment income.

A premium deficiency occurs if the sum of anticipated losses and loss adjustment expenses, unamortized acquisition costs and maintenance costs exceed unearned premiums (including expected future premiums) and anticipated investment income. A premium deficiency reserve ("PDR") is recorded by charging any unamortized acquisition costs to expense to the extent required in order to eliminate the deficiency. If the premium deficiency exceeds unamortized acquisition costs then a liability is accrued for the excess deficiency.

To assess the need for a PDR on mortgage exposures, the Company develops loss projections based on modeled loan defaults related to its current policies in force. This projection is based on recent trends in default experience, severity and rates of defaulted loans moving to claim, as well as recent trends in the rate at which loans are prepaid, and incorporates anticipated interest income. Evaluating the expected profitability of the Company's existing mortgage insurance business and the need for a PDR for its mortgage business involves significant reliance upon assumptions and estimates with regard to the likelihood, magnitude and timing of potential losses and premium revenues.

No premium deficiency charges were recorded by the Company during 2019, 2018 or 2017.

(c) Deposit Accounting

Certain assumed reinsurance contracts that are deemed not to transfer insurance risk, are accounted for using the deposit method of accounting. However, it is possible that the Company could incur financial losses on such contracts. Management exercises significant judgment in the assumptions used in determining whether assumed contracts should be accounted for as reinsurance contracts or deposit contracts. For those contracts that contain only significant underwriting risk, the estimated profit margin is deferred and amortized over the contract period and such amount is included in the Company's underwriting results. When the estimated profit margin is explicit, the margin is reflected as other underwriting income and any adverse financial results on such contracts are reflected as incurred losses. When the estimated profit margin is implicit, the margin is reflected as an offset to paid losses and any adverse financial results on such contracts are reflected as incurred losses. Additional judgments are required when applying the accounting guidance with respect to the revenue recognition criteria for contracts deemed to transfer only significant underwriting risk. For those contracts that contain only significant timing risk, an accretion rate is established at inception of the contract based on actuarial estimates whereby the deposit accounting liability is increased to the estimated amount payable over the contract term. The accretion on the deposit is based on the expected rate of return required to fund the expected future payment obligations. Periodically the Company reassesses the estimated ultimate liability and the related expected rate of return. The accretion of the deposit accounting liability as well as changes to the estimated ultimate liability and the accretion rate would be reflected as part of interest expense in the Company's results of operations. Any negative accretion in a deposit accounting liability is shown in other underwriting income in the Company's results of operations.

Under some of these contracts, the ceding company retains the related assets on a funds-held basis. Such amounts are included in "Other assets" on the Company's balance sheet. Interest income produced by those assets are recorded as part of net investment income in the Company's results of operations.

(d) Retroactive Reinsurance

Retroactive reinsurance reimburses a ceding company for liabilities incurred as a result of past insurable events covered by the underlying policies reinsured. In certain instances, reinsurance contracts cover losses both on a prospective basis and on a retroactive basis and, accordingly, the Company bifurcates the prospective and retrospective elements of these reinsurance contracts and accounts for each element separately where practical. Underwriting income generated in connection with retroactive reinsurance contracts is deferred and amortized into income over the settlement period while losses are charged to income immediately. Subsequent changes in estimated amount or timing of cash flows under such retroactive reinsurance contracts are accounted for by adjusting the previously deferred amount to the balance that would have existed had the revised estimate been available at the inception of the reinsurance transaction, with a corresponding charge or credit to income.

(e) Reinsurance Ceded

In the normal course of business, the Company purchases reinsurance to increase capacity and to limit the impact of individual losses and events on its underwriting results by reinsuring certain levels of risk with other insurance enterprises or reinsurers. The Company uses pro rata, excess of loss and facultative reinsurance contracts. Reinsurance ceding commissions that represent a recovery of acquisition costs are recognized as a reduction to acquisition costs while the remaining portion is deferred. The accompanying consolidated statement of income reflects premiums and losses and loss adjustment expenses and acquisition costs, net of reinsurance ceded. See note 7, "Reinsurance" for information on the Company's reinsurance usage. Reinsurance premiums ceded and unpaid losses and loss adjustment expenses recoverable are estimated in a manner consistent with that of the original policies issued and the terms of the reinsurance contracts. If the reinsurers are unable to satisfy their obligations under the agreements, the Company's insurance or reinsurance subsidiaries would be liable for such defaulted amounts.

(f) Cash

Cash includes cash equivalents, which are investments with original maturities of three months or less which are not part of the investment portfolio.

(g) Restricted Cash

Restricted cash represents amounts held for the benefit of third parties and is legally or contractually restricted as to withdrawal or usage by the Company. Such amounts are included in "Other assets" on the Company's balance sheet.

(h) Investments

The Company currently classifies substantially all of its fixed maturity investments and short-term investments as "available for sale" and, accordingly, they are carried at estimated fair value (also known as fair value) with the changes in fair value recorded as an unrealized gain or loss component of accumulated other comprehensive income in shareholders' equity. The fair value of fixed maturity securities and equity securities is generally determined from quotations received from nationally recognized pricing services, or when such prices are not available, by reference to broker or underwriter bid indications. Short-term investments comprise securities due to mature within one year of the date of issue. Short-term investments include certain cash equivalents which are part of investment portfolios under the management of external and internal investment managers.

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. Such securities have been reclassified as "Securities pledged under securities lending, at fair value." The Company maintains legal control over the securities it lends, 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. Collateral received is required at a rate of 102% or greater of the fair value of the loaned securities including accrued investment income and is monitored and maintained by the lending agent. Such collateral is reflected as "Collateral received under securities lending, at fair value."

The Company's investment portfolio includes certain funds that, due to their ownership structure, are accounted for by the Company using the equity method. In applying the equity method, these 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 funds (which include changes in the fair 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. Changes in the carrying value of such investments are recorded in net income as "Equity in net income (loss) of investments accounted for using the equity method." As such, fluctuations in the carrying value of the investments accounted for using the equity method may increase the volatility of the Company's reported results of operations.

The Company's investment portfolio includes equity securities that are accounted for at fair value. Such holdings primarily include publicly traded common stocks. Dividend income on equities is reflected in net investment income. Changes in fair value on equity securities are included in "Net realized gains (losses)" in the consolidated statement of income.

The Company elected to carry certain fixed maturity securities, equity securities and other investments at fair value under the fair value option afforded by accounting guidance regarding the fair value option for financial assets and liabilities. The fair value for certain of the Company's other investments are determined using net asset values ("NAVs") as advised by external fund managers. The NAV is based on the fund manager's valuation of the underlying holdings in accordance with the fund's governing documents.

Changes in fair value of investments accounted for using the fair value option are included in "Net realized gains (losses)." The primary reasons for electing the fair value option were to address simplification and cost-benefit considerations.

The Company invests in limited partner interests and shares of limited liability companies. Such amounts are included in investments accounted for using the equity method, other investments available for sale and investments accounted for using the fair value option. These investments can often have characteristics of a variable interest entity ("VIE"). A VIE refers to entities that have characteristics such as (i) insufficient equity at risk to allow the entity to finance its activities without additional financial support or (ii) instances where the equity investors, as a group, do not have the characteristic of a controlling financial interest. If the Company is determined to be the primary beneficiary, it is required to consolidate the VIE. The primary beneficiary is defined as the variable interest holder that is determined to have the controlling financial interest as a result of having both (i) the power to direct the activities of a VIE that most significantly impact the economic performance of the VIE and (ii) the obligation to absorb losses or right to receive benefits from the VIE that could potentially be significant to the VIE. At inception of the VIE as well as on an ongoing basis, the Company determines whether it is the primary beneficiary based on an analysis of the Company's level of involvement in the VIE, the contractual terms, and the overall structure of the VIE. 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 Company performs quarterly reviews of its investments to determine whether declines in fair value below the cost basis are considered other-than-temporary in accordance with applicable accounting guidance regarding the recognition and presentation of OTTI. The process of determining whether a security is other-than-temporarily impaired requires judgment and involves analyzing many factors. These factors include (i) an analysis of the liquidity, business prospects and overall financial condition of the issuer, (ii) the time period in which there was a significant decline in value, (iii) the significance of the decline and (iv) the analysis of specific credit events.

When there are credit-related losses associated with debt securities for which the Company does not have an intent to sell and it is more likely than not that it will not be required to sell the security before recovery of its cost basis, the amount of the OTTI related to a credit loss is recognized in earnings and the amount of the OTTI related to other factors (*e.g.*, interest rates, market conditions, etc.) is recorded as a component of other comprehensive income (loss). The amount of the credit loss of an impaired debt security is the difference between the amortized cost and the greater of (i) the present value of expected future cash flows and (ii) the fair value of the security. In instances where no credit loss exists but it is more likely than not that the Company will have to sell the debt security prior to the anticipated recovery, the decline in fair value below amortized cost is recognized as an OTTI in earnings. In periods after the recognition of an OTTI on debt securities, the Company accounts for such securities as if they had been purchased on the measurement date of the OTTI at an amortized cost basis equal to the previous amortized cost basis less the OTTI recognized in earnings. For debt securities for which OTTI were recognized in earnings, the difference between the new amortized cost basis and the cash flows expected to be collected will be accreted or amortized into net investment income. See note 8, "Investment Information" for additional information.

Net investment income includes interest and dividend income together with amortization of market premiums and discounts and is net of investment management and custody fees. Anticipated prepayments and expected maturities are used in applying the interest method for certain investments such as mortgage and other asset-backed securities. When actual prepayments differ significantly from anticipated prepayments, the effective yield is recalculated to reflect actual payments to date and anticipated future payments. The net investment in such securities is adjusted to the amount that would have existed had the new effective yield been applied since the acquisition of the security. Such adjustments, if any, are included in net investment income when determined.

Investment gains or losses realized on the sale of investments, except for certain fund investments, are determined on a first-in, first-out basis and are reflected in net income. Investment gains or losses realized on the sale of certain fund investments are determined on an average cost basis. Unrealized appreciation or decline in the value of available for sale securities, which are carried at fair value, is excluded from net income and recorded as a separate component of accumulated other comprehensive income, net of applicable deferred income tax.

(i) Derivative Instruments

The Company recognizes all derivative instruments, including embedded derivative instruments, at fair value in its consolidated balance sheets. The Company employs the use of derivative instruments within its operations to mitigate risks arising from assets and liabilities held in foreign currencies as well as part of its overall investment strategy. For such instruments, changes in assets and liabilities measured at fair value are recorded as "Net realized gains" in the consolidated statements of income. In addition, the Company's derivative instruments include amounts related to underwriting activities where an insurance or reinsurance contract meets the accounting definition of a derivative instrument. For such contracts, changes in fair value are reflected in "Other underwriting income" in the consolidated statements of income as the underlying contract originates from the Company's underwriting operations. For the periods ended 2019, 2018, and 2017, the Company did not designate any derivative instruments as hedges under the relevant accounting guidance. See note 10, "Derivative Instruments" for additional information.

(j) Reserves for Losses and Loss Adjustment Expenses

Insurance and Reinsurance. The reserve for losses and loss adjustment expenses consists of estimates of unpaid reported losses and loss adjustment expenses and estimates for losses incurred but not reported. The reserve for unpaid reported losses and loss adjustment expenses, established by management based on reports from ceding companies and claims from insureds, excludes estimates of amounts related to losses under high deductible policies, and represents the estimated ultimate cost of events or conditions that have been reported to or specifically identified by the Company. Such reserves are supplemented by management's estimates of reserves for losses incurred for which reports or claims have not been received. The Company's reserves are based on a combination of reserving methods, incorporating both Company and industry loss development patterns. The Company selects the initial expected loss and loss adjustment expense ratios based on information derived by its underwriters and actuaries during the initial pricing of the business, supplemented by industry data where appropriate. Such ratios consider, among other things, rate changes and changes in terms and conditions that have been observed in the market. These estimates are reviewed regularly and, as experience develops and new information becomes known, the reserves are adjusted as necessary. Such adjustments, if any, are reflected in income in the period in which they are determined. As actual loss information has been reported, the Company has developed its own loss experience and its reserving methods include other actuarial techniques. Over time, such techniques have been given further weight in its reserving process based on the continuing maturation of the Company's reserves. Inherent in the estimates of ultimate losses and loss adjustment expenses are expected trends in claims severity and frequency and other factors which may vary significantly as claims are settled. Accordingly, ultimate losses and loss adjustment expenses may differ materially from the amounts recorded in the accompanying consolidated financial statements. Losses and loss adjustment expenses are recorded on an undiscounted basis, except for excess workers' compensation and employers' liability business written by the Company's insurance operations.

Mortgage. The reserves for mortgage guaranty insurance losses and loss adjustment expenses are the estimated claim settlement costs on notices of delinquency that have been received by the Company, as well as loan delinquencies that have been incurred but have not been reported by the lenders. Consistent with primary mortgage insurance industry accounting practice, the Company does not establish loss reserves for future claims on insured loans that are not currently delinquent (defined as two consecutive missed payments). The Company establishes loss reserves on a case-by-case basis when insured loans are reported delinquent using estimated claim rates and average claim sizes for each cohort, net of any salvage recoverable. The Company also reserves for delinquencies that have occurred but have not yet been reported to the Company prior to the close of an accounting period. To determine this reserve, the Company estimates the number of delinquencies not yet reported using historical information regarding late reported delinquencies and applies estimated claim rates and claim sizes for the estimated delinquencies not yet reported.

The establishment of reserves across the Company's segments is an inherently uncertain process, are necessarily based on estimates, and the ultimate net cost may vary from such estimates. The methods for making such estimates and for establishing the resulting liability are reviewed and updated using the most current information available. Any resulting adjustments, which may be material, are reflected in current operations.

(k) Contractholder Receivables and Payables and Collateral Held for Insured Obligations

Certain insurance policies written by the Company's insurance operations feature large deductibles, primarily in its construction and national accounts lines 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 policyholder for the deductible amount. These amounts are included on a gross basis in the consolidated balance sheet in contractholder payables and contractholder receivables, respectively. 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. In the instances where the Company receives collateral in the form of cash, the Company reflects it in "Collateral held for insured obligations."

(l) Foreign Exchange

Assets and liabilities of foreign operations whose functional currency is not the U.S. Dollar are translated at the prevailing exchange rates at each balance sheet date. Revenues and expenses of such foreign operations are translated at average exchange rates during the year. The net effect of the translation adjustments for foreign operations is included in accumulated other comprehensive income, net of applicable deferred income tax. Monetary assets and liabilities, such as premiums receivable and the reserve for losses and loss adjustment expenses, denominated in foreign currencies are revalued at the exchange rate in effect at the balance sheet date with the resulting foreign exchange gains and losses included in net income. Accounts that are classified as non-monetary, such as deferred acquisition costs and the unearned premium reserves, are not revalued. In the case of foreign currency denominated fixed maturity securities which are classified as "available for sale," the change in exchange rates between the local currency in which the investments are denominated and the Company's functional currency at each balance sheet date is included in unrealized appreciation or decline in value of securities, a component of accumulated other comprehensive income, net of applicable deferred income tax.

(m) Income Taxes

Deferred income taxes reflect the expected future tax consequences of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and amounts used for income tax purposes. A valuation allowance is recorded if it is more likely than not that some or all of a deferred tax asset may not be realized. The Company considers future taxable income and feasible tax planning strategies in assessing the need for a valuation allowance. In the event the Company determines that it will not be able to realize all or part of its deferred income tax assets in the future, an adjustment to the deferred income tax assets would be charged to income in the period in which such determination is made. In addition, if the Company subsequently assesses that the valuation allowance is no longer needed, a benefit would be recorded to income in the period in which such determination is made. See note 14, "Income Taxes" for additional information.

The Company recognizes a tax benefit where it concludes that it is more likely than not that the tax benefit will be sustained on audit by the taxing authority based solely on the technical merits of the associated tax position. If the recognition threshold is met, the Company recognizes a tax benefit measured at the largest amount of the tax benefit that, in the Company's judgment, is greater than 50% likely to be realized. The Company records interest and penalties related to unrecognized tax benefits in the provision for income taxes.

(n) Share-Based Payment Arrangements

The Company applies a fair value based measurement method in accounting for its share-based payment arrangements with eligible employees and directors. Compensation expense is estimated based on the fair value of the award at the grant date and is recognized in net income over the requisite service period with a corresponding increase in shareholders' equity. No value is attributed to awards that employees forfeit because they fail to satisfy vesting conditions. The Company's (i) time-based awards generally vest over a three year period with one-third vesting on the first, second and third anniversaries of the grant date and (ii) performance-based awards cliff vest after each three year performance period based on achievement of the specified performance criteria. The share-based compensation expense associated with awards that have graded vesting features and vest based on service conditions only is calculated on a straight-line basis over the requisite service period for the entire award. Compensation expense recognized in connection with performance awards is based on the achievement of the specified performance and service conditions. The final measure of compensation expense recognized over the requisite service period reflects the final performance outcome. During the recognition period compensation expense is accrued based on the performance condition that is probable of achievement. For awards granted to retirement-eligible employees where no service is required for the employee to retain the award, the grant date fair value is immediately recognized as compensation expense at the grant date because the employee is able to retain the award without continuing to provide service. For employees near retirement eligibility, attribution of compensation cost is over the period from the grant date to the retirement eligibility date. These charges had no impact on the Company's cash flows or total shareholders' equity. See note 21, "Share-Based Compensation" for information relating to the Company's share-based payment awards.

(o) Guaranty Fund and Other Related Assessments

Liabilities for guaranty fund and other related assessments in the Company's insurance and reinsurance operations are accrued when the Company receives notice that an amount is payable, or earlier if a reasonable estimate of the assessment can be made.

(p) Treasury Shares

Treasury shares are common shares purchased by the Company and not subsequently canceled. These shares are recorded at cost and result in a reduction of the Company's shareholders' equity in its Consolidated Balance Sheets.

(q) Goodwill and Intangible Assets

Goodwill represents the excess of the purchase price of an acquisition over the fair value of the net assets acquired and is assigned to the applicable reporting unit at acquisition. Goodwill is evaluated for impairment on an annual basis. Impairment tests may be performed more frequently if the facts and circumstances indicate a possible impairment. In performing impairment tests, the Company may first assess qualitative factors to determine whether it is more likely than not (that is, more than a 50% probability) that the fair value of a reporting unit exceeds its carrying amount as a basis for determining whether it is necessary to perform the two-step goodwill impairment test described in the accounting guidance.

Indefinite-lived intangible assets, such as insurance licenses are evaluated for impairment similar to goodwill. Finite-lived intangible assets and liabilities include the value of acquired insurance and reinsurance contracts, which are estimated based on the present value of future expected cash flows and amortized in proportion to the estimated profits expected to be realized. Other finite-lived intangible assets or liabilities, including favorable or unfavorable contracts, are amortized over their useful lives. Finite-lived intangible assets and liabilities are periodically reviewed for indicators of impairment. An impairment is recognized when the carrying amount is not recoverable from its undiscounted cash flows and is measured as the difference between the carrying amount and fair value.

If goodwill or intangible assets are impaired, such assets are written down to their fair values with the related expense recorded in the Company's results of operations.

(r) Recent Accounting Pronouncements

Recently Issued Accounting Standards Adopted

The Company adopted ASU 2016-02, "Leases (Topic 842)", which provides a new comprehensive model for lease accounting. Topic 842 requires a lessee to recognize a liability to make lease payments (the lease liability) and a right-of-use asset representing its right to use the underlying asset for the lease term. The Company adopted the modified retrospective approach of this standard, that resulted in the recognition of a right-of-use asset of $147.9 million as part of other assets and a lease liability of $163.6 million as part of other liabilities in the consolidated balance sheet as of January 1, 2019. The Company de-recognized the liability for deferred rent that was required under the previous guidance.

In addition, the Company adopted ASU 2018-11, "Leases: Targeted Improvements (Topic 842)," which provides an additional (optional) transition method to adopt the new lease standard. The Company adopted the alternative transition method and elected to utilize a cumulative-effect adjustment to the opening balance of the retained earnings for the year of adoption. As such, the Company's reporting for the comparative periods prior to the adoption continue to be presented in the financial statements in accordance with previous lease accounting guidance. The Company also adopted the practical expedients as a package which allows the Company to not reassess (1) whether any expired or existing contracts are or contain leases (2) the lease classification for any expired or existing leases (3) initial direct costs for any existing leases and (4) to account for the lease and non-lease components as a single lease component. In addition to electing the practical expedients as a package, the Company elected to include hindsight to determine the lease term of existing leases, and made an accounting policy election to not apply the recognition requirements to short-term leases (lease term of less than twelve months). The cumulative effect adjustment to the opening balance of retained earnings was zero. The adoption of the updated guidance did not have a material effect on the Company's results of operations or liquidity.

The Company adopted ASU 2018-07 "Improvements to Nonemployee Share-Based Payment Accounting," which was issued in June 2018 to simplify the accounting for share-based payments granted to nonemployees for goods and services. Under this ASU, most of the guidance on such payments to nonemployees would be aligned with the requirements for share-based payments granted to employees. The ASU is effective for reporting periods beginning after December 15, 2018. This guidance and the adoption of this provision did not have a material effect on the Company's financial position, results of operations or cash flows.

The Company adopted ASU 2018-02 "Income Statement Reporting Comprehensive Income (Topic 220) - Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income," which was issued in February 2018 to allow the reclassification of the stranded tax effects in accumulated other comprehensive income ("AOCI") resulting from the Tax Cuts and Jobs Act of 2017 ("Tax Cuts Act"). Current guidance requires the effect of a change in tax laws or rates on deferred tax balances to be reported in income from continuing operations in the accounting period that includes the period of enactment, even if the related income tax effects were originally charged or credited directly to AOCI. The amount of the reclassification would include the effect of the change in the U.S. federal corporate income tax rate on the gross deferred tax amounts and related valuation allowances, if any, at the date of the enactment of the Tax Cuts Act related to items in AOCI.

The updated guidance is effective for reporting periods beginning after December 15, 2018 and is to be applied retrospectively to each period in which the effect of the Tax Cuts Act related to items remaining in AOCI are recognized or at the beginning of the period of adoption. The adoption of this ASU did not have a material effect on the Company's results of operations, financial position or liquidity.

The Company adopted ASU 2017-08 "Receivables - Nonrefundable Fees and Other Costs (Subtopic 310-20), Premium Amortization on Purchased Callable Debt Securities," which was issued in March 2017. This ASU shortens the amortization period for certain callable debt securities held at a premium and requires the premium to be amortized to the earliest call date. However, the new guidance does not require an accounting change for securities held at a discount whose discount continues to be amortized to maturity. The standard is effective for financial statements issued for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted. The adoption of the guidance requires a modified retrospective approach with a cumulative-effect adjustment to retained earnings. The adoption of this ASU did not have a material effect on the Company's consolidated financial statements.

Recently Issued Accounting Standards Not Yet Adopted

ASU 2016-13, "Financial Instruments - Credit Losses (Topic 326)," was issued in June 2016. The ASU changes how entities will measure credit losses for most financial assets and certain other instruments that aren't measured at fair value through net income. The ASU 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 ASU is effective for the 2020 first quarter, and should be applied on a modified retrospective basis for the majority of the provisions with a cumulative-effect adjustment to retained earnings at the beginning of the year of adoption. Upon adoption, the Company expects the new standard to have an impact on certain type of investment securities, reinsurance recoverables and contractholder receivables. The Company will adopt the ASU on January 1, 2020 by applying the modified retrospective approach. The Company anticipates recording a cumulative-effect adjustment to the opening balance of retained earnings, which is not expected to have a material effect on the consolidated financial statements.

ASU 2018-13, "Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement," 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 Company is currently evaluating the impact of the new guidance on its consolidated financial statements and does not expect this guidance to have a material effect on the Company's consolidated financial statements.

ASU 2018-15, "Intangibles - Goodwill and Other - *Internal-Use Software (Subtopic 350-40)*," 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 is currently evaluating the impact of the new guidance on the consolidated financial statements. The Company is currently evaluating the impact of the new guidance on its consolidated financial statements and does not expect this guidance to have a material effect on the Company's consolidated financial statements.

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:* 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 1000 companies and smaller transaction business programs.

The reinsurance segment consists of the Company's 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 of 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 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.

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. AMIC and UGRIC (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 government sponsored enterprise, or "GSE."

The corporate (non-underwriting) segment results include net investment income, other income (loss), other expenses incurred by the Company, interest expense, net realized gains or losses, net impairment losses included in earnings, equity in net income or loss of investments accounted for using the equity method, net foreign exchange gains or losses, transaction costs and other, income taxes and items related to the Company's non-cumulative preferred shares. Such amounts exclude the results of the 'other' segment.

The 'other' segment includes the results of Watford (see note 11, "Variable Interest Entity and Noncontrolling Interests"). Watford has its own management and board of directors that is responsible for the overall profitability of the 'other' segment. For the 'other' segment, performance is measured based on net income or loss.

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, summary information regarding net premiums written and earned by major line of business and net premiums written by location:

	Year Ended December 31, 2019					
	Insurance	Reinsurance	Mortgage	Sub-Total	Other	Total
Gross premiums written (1)	$ 3,907,993	$ 2,323,223	$ 1,466,265	$ 7,695,645	$ 754,881	$ 8,138,960
Premiums ceded	(1,266,267)	(720,500)	(204,509)	(2,189,440)	(222,019)	(2,099,893)
Net premiums written	2,641,726	1,602,723	1,261,756	5,506,205	532,862	6,039,067
Change in unearned premiums	(244,646)	(136,334)	104,584	(276,396)	23,827	(252,569)
Net premiums earned	2,397,080	1,466,389	1,366,340	5,229,809	556,689	5,786,498
Other underwriting income (loss)	—	6,444	16,005	22,449	2,412	24,861
Losses and loss adjustment expenses	(1,615,475)	(1,011,329)	(53,513)	(2,680,317)	(453,135)	(3,133,452)
Acquisition expenses	(361,614)	(239,032)	(134,319)	(734,965)	(105,980)	(840,945)
Other operating expenses	(454,770)	(141,484)	(153,092)	(749,346)	(51,651)	(800,997)
Underwriting income (loss)	$ (34,779)	$ 80,988	$ 1,041,421	1,087,630	(51,665)	1,035,965
Net investment income				491,067	136,671	627,738
Net realized gains (losses)				351,202	15,161	366,363
Net impairment losses recognized in earnings				(3,165)	—	(3,165)
Equity in net income (loss) of investments accounted for using the equity method				123,672	—	123,672
Other income (loss)				2,233	—	2,233
Corporate expenses				(65,667)	—	(65,667)
Transaction costs and other				(14,444)	—	(14,444)
Amortization of intangible assets				(82,104)	—	(82,104)
Interest expense				(93,735)	(27,137)	(120,872)
Net foreign exchange gains (losses)				(9,252)	(11,357)	(20,609)
Income (loss) before income taxes				1,787,437	61,673	1,849,110
Income tax expense				(155,790)	(20)	(155,810)
Net income (loss)				1,631,647	61,653	1,693,300
Dividends attributable to redeemable noncontrolling interests				—	(16,909)	(16,909)
Amounts attributable to nonredeemable noncontrolling interests				—	(40,072)	(40,072)
Net income (loss) available to Arch				1,631,647	4,672	1,636,319
Preferred dividends				(41,612)	—	(41,612)
Loss on redemption of preferred shares				—	—	—
Net income (loss) available to Arch common shareholders				$ 1,590,035	$ 4,672	$ 1,594,707
Underwriting Ratios						
Loss ratio	67.4%	69.0%	3.9%	51.3%	81.4%	54.2%
Acquisition expense ratio	15.1%	16.3%	9.8%	14.1%	19.0%	14.5%
Other operating expense ratio	19.0%	9.6%	11.2%	14.3%	9.3%	13.8%
Combined ratio	101.5%	94.9%	24.9%	79.7%	109.7%	82.5%
Goodwill and intangible assets	$ 289,021	$ 2,516	$ 438,896	$ 730,433	$ 7,650	$ 738,083
Total investable assets				$ 22,285,676	$ 2,704,589	$ 24,990,265
Total assets				34,374,468	3,510,893	37,885,361
Total liabilities				22,977,636	2,592,173	25,569,809

(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.

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

	Year Ended December 31, 2018					
	Insurance	Reinsurance	Mortgage	Sub-Total	Other	Total
Gross premiums written (1)	$ 3,262,332	$ 1,912,522	$ 1,360,708	$ 6,534,423	$ 735,015	$ 6,961,004
Premiums ceded	(1,050,207)	(539,950)	(202,833)	(1,791,851)	(130,840)	(1,614,257)
Net premiums written	2,212,125	1,372,572	1,157,875	4,742,572	604,175	5,346,747
Change in unearned premiums	(6,464)	(111,356)	28,361	(89,459)	(25,313)	(114,772)
Net premiums earned	2,205,661	1,261,216	1,186,236	4,653,113	578,862	5,231,975
Other underwriting income	—	(682)	13,033	12,351	2,722	15,073
Losses and loss adjustment expenses	(1,520,680)	(846,882)	(81,289)	(2,448,851)	(441,255)	(2,890,106)
Acquisition expenses, net	(349,702)	(211,280)	(118,595)	(679,577)	(125,558)	(805,135)
Other operating expenses	(364,138)	(133,350)	(142,432)	(639,920)	(37,889)	(677,809)
Underwriting income (loss)	$ (28,859)	$ 69,022	$ 856,953	897,116	(23,118)	873,998
Net investment income				437,958	125,675	563,633
Net realized gains (losses)				(284,429)	(120,915)	(405,344)
Net impairment losses recognized in earnings				(2,829)	—	(2,829)
Equity in net income (loss) of investments accounted for using the equity method				45,641	—	45,641
Other income (loss)				2,419	—	2,419
Corporate expenses				(58,608)	—	(58,608)
Transaction costs and other				(11,386)	(9,000)	(20,386)
Amortization of intangible assets				(105,670)	—	(105,670)
Interest expense				(101,019)	(19,465)	(120,484)
Net foreign exchange gains (losses)				58,711	10,691	69,402
Income (loss) before income taxes				877,904	(36,132)	841,772
Income tax (expense) benefit				(113,924)	(27)	(113,951)
Net income (loss)				763,980	(36,159)	727,821
Dividends attributable to redeemable noncontrolling interests				—	(18,357)	(18,357)
Amounts attributable to nonredeemable noncontrolling interests				—	48,507	48,507
Net income (loss) available to Arch				763,980	(6,009)	757,971
Preferred dividends				(41,645)	—	(41,645)
Loss on redemption of preferred shares				(2,710)	—	(2,710)
Net income (loss) available to Arch common shareholders				$ 719,625	$ (6,009)	$ 713,616
Underwriting Ratios						
Loss ratio	68.9%	67.1%	6.9%	52.6%	76.2%	55.2%
Acquisition expense ratio	15.9%	16.8%	10.0%	14.6%	21.7%	15.4%
Other operating expense ratio	16.5%	10.6%	12.0%	13.8%	6.5%	13.0%
Combined ratio	101.3%	94.5%	28.9%	81.0%	104.4%	83.6%
Goodwill and intangible assets	$ 114,012	$ —	$ 513,258	$ 627,270	$ 7,650	$ 634,920
Total investable assets				$ 19,566,861	$ 2,757,663	$ 22,324,524
Total assets				28,845,473	3,372,856	32,218,329
Total liabilities				19,518,395	2,262,255	21,780,650

(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.

	Year Ended December 31, 2017					
	Insurance	Reinsurance	Mortgage	Sub-Total	Other	Total
Gross premiums written (1)	$ 3,081,086	$ 1,640,399	$ 1,368,138	$ 6,088,254	$ 600,304	$ 6,368,425
Premiums ceded	(958,646)	(465,925)	(256,796)	(1,679,998)	(47,187)	(1,407,052)
Net premiums written	2,122,440	1,174,474	1,111,342	4,408,256	553,117	4,961,373
Change in unearned premiums	(9,422)	(31,853)	(54,176)	(95,451)	(21,390)	(116,841)
Net premiums earned	2,113,018	1,142,621	1,057,166	4,312,805	531,727	4,844,532
Other underwriting income	—	11,336	15,737	27,073	3,180	30,253
Losses and loss adjustment expenses	(1,622,444)	(773,923)	(134,677)	(2,531,044)	(436,402)	(2,967,446)
Acquisition expenses, net	(323,639)	(221,250)	(100,598)	(645,487)	(129,971)	(775,458)
Other operating expenses	(359,524)	(146,663)	(146,336)	(652,523)	(31,928)	(684,451)
Underwriting income (loss)	$ (192,589)	$ 12,121	$ 691,292	510,824	(63,394)	447,430
Net investment income				382,072	88,800	470,872
Net realized gains (losses)				148,798	343	149,141
Net impairment losses recognized in earnings				(7,138)	—	(7,138)
Equity in net income (loss) of investments accounted for using the equity method				142,286	—	142,286
Other income (loss)				(2,571)	—	(2,571)
Corporate expenses				(61,602)	—	(61,602)
Transaction costs and other				(22,150)	—	(22,150)
Amortization of intangible assets				(125,778)	—	(125,778)
Interest expense				(103,592)	(13,839)	(117,431)
Net foreign exchange gains (losses)				(113,345)	(2,437)	(115,782)
Income (loss) before income taxes				747,804	9,473	757,277
Income tax benefit				(127,547)	(21)	(127,568)
Net income				620,257	9,452	629,709
Dividends attributable to redeemable noncontrolling interests				—	(18,344)	(18,344)
Amounts attributable to nonredeemable noncontrolling interests				—	7,913	7,913
Net income (loss) available to Arch				620,257	(979)	619,278
Preferred dividends				(46,041)	—	(46,041)
Loss on redemption of preferred shares				(6,735)	—	(6,735)
Net income (loss) available to Arch common shareholders				$ 567,481	$ (979)	$ 566,502
Underwriting Ratios						
Loss ratio	76.8%	67.7%	12.7%	58.7%	82.1%	61.3%
Acquisition expense ratio	15.3%	19.4%	9.5%	15.0%	24.4%	16.0%
Other operating expense ratio	17.0%	12.8%	13.8%	15.1%	6.0%	14.1%
Combined ratio	109.1%	99.9%	36.0%	88.8%	112.5%	91.4%
Goodwill and intangible assets	$ 22,310	$ 211	$ 622,440	$ 644,961	$ 7,650	$ 652,611
Total investable assets				$ 19,716,421	$ 2,440,067	$ 22,156,488
Total assets				29,037,004	3,014,654	32,051,658
Total liabilities				19,959,574	1,846,149	21,805,723

(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.

The following tables provide summary information regarding net premiums earned by major line of business and net premiums written by underwriting location:

INSURANCE SEGMENT	Year Ended December 31, 2019	2018	2017
Net premiums earned (1)			
Professional lines (2)	$ 499,224	$ 458,425	$ 444,137
Programs	414,103	389,186	364,639
Property, energy, marine and aviation	298,966	205,069	173,779
Construction and national accounts	325,687	322,440	324,517
Travel, accident and health	305,085	297,147	257,358
Excess and surplus casualty (3)	200,615	172,424	195,154
Lenders products	66,079	94,248	97,043
Other (4)	287,321	266,722	256,391
Total	$ 2,397,080	$ 2,205,661	$ 2,113,018
Net premiums written by underwriting location (1)			
United States	$ 1,983,476	$ 1,736,651	$ 1,715,467
Europe	559,214	401,974	344,836
Other	99,036	73,500	62,137
Total	$ 2,641,726	$ 2,212,125	$ 2,122,440

(1) Insurance segment results include premiums assumed through intersegment transactions and exclude premiums ceded through intersegment transactions.
(2) Includes professional liability, executive assurance and healthcare business.
(3) Includes casualty and contract binding business.
(4) Includes alternative markets, excess workers' compensation and surety business.

REINSURANCE SEGMENT	Year Ended December 31, 2019	2018	2017
Net premiums earned (1)			
Other specialty (2)	$ 478,517	$ 474,568	$ 408,566
Casualty (3)	429,288	347,034	341,122
Property excluding property catastrophe	362,841	287,788	255,453
Property catastrophe	90,934	75,249	73,300
Marine and aviation	48,274	39,238	36,214
Other (4)	56,535	37,339	27,966
Total	$ 1,466,389	$ 1,261,216	$ 1,142,621
Net premiums written by underwriting location (1)			
United States	$ 529,943	$ 413,550	$ 399,379
Bermuda	578,618	487,523	350,681
Europe and other	494,162	471,499	424,414
Total	$ 1,602,723	$ 1,372,572	$ 1,174,474

(1) Reinsurance segment results include premiums assumed through intersegment transactions and exclude premiums ceded through intersegment transactions.
(2) Includes proportional motor, surety, accident and health, workers’ compensation catastrophe, agriculture, trade credit and other.
(3) Includes executive assurance, professional liability, workers’ compensation, excess motor, healthcare and other.
(4) Includes life, casualty clash and other.

MORTGAGE SEGMENT	Year Ended December 31, 2019	2018	2017
Net premiums earned by underwriting location			
United States	$ 1,134,849	$ 1,009,765	$ 901,858
Other	231,491	176,471	155,308
Total	$ 1,366,340	$ 1,186,236	$ 1,057,166
Net premiums written by underwriting location			
United States	$ 1,032,868	$ 948,323	$ 903,329
Other	228,888	209,552	208,013
Total	$ 1,261,756	$ 1,157,875	$ 1,111,342

OTHER SEGMENT	Year Ended December 31, 2019	2018	2017
Net premiums earned (1)			
Casualty (2)	$ 246,894	$ 277,589	$ 333,275
Other specialty (3)	185,547	204,485	135,855
Property catastrophe	13,399	10,998	12,690
Property excluding property catastrophe	3,503	2,802	1,392
Other (4)	107,346	82,988	48,515
Total	$ 556,689	$ 578,862	$ 531,727
Net premiums written by underwriting location (1)			
United States	$ 127,176	$ 49,800	$ 11,750
Europe	52,065	91,635	91,463
Bermuda	353,621	462,740	449,904
Total	$ 532,862	$ 604,175	$ 553,117

(1) Other segment results include premiums assumed through intersegment transactions and exclude premiums ceded through intersegment transactions.
(2) Includes professional liability, excess motor, programs and other.
(3) Includes proportional motor and other.
(4) Includes mortgage and other.

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:

	Year Ended December 31,		
	2019	2018	2017
Reserve for losses and loss adjustment expenses at beginning of year	$ 11,853,297	$ 11,383,792	$ 10,200,960
Unpaid losses and loss adjustment expenses recoverable	2,814,291	2,464,910	2,083,575
Net reserve for losses and loss adjustment expenses at beginning of year	9,039,006	8,918,882	8,117,385
Net incurred losses and loss adjustment expenses relating to losses occurring in:			
Current year	3,297,037	3,162,818	3,205,428
Prior years	(163,585)	(272,712)	(237,982)
Total net incurred losses and loss adjustment expenses	3,133,452	2,890,106	2,967,446
Net losses and loss adjustment expense reserves of acquired business (1)	209,486	—	—
Retroactive reinsurance transactions (2)	(225,500)	(420,404)	—
Foreign exchange (gains) losses	36,003	(143,414)	186,963
Net paid losses and loss adjustment expenses relating to losses occurring in:			
Current year	(621,202)	(524,048)	(505,424)
Prior years	(1,762,053)	(1,682,116)	(1,847,488)
Total net paid losses and loss adjustment expenses	(2,383,255)	(2,206,164)	(2,352,912)
Net reserve for losses and loss adjustment expenses at end of year	9,809,192	9,039,006	8,918,882
Unpaid losses and loss adjustment expenses recoverable	4,082,650	2,814,291	2,464,910
Reserve for losses and loss adjustment expenses at end of year	$ 13,891,842	$ 11,853,297	$ 11,383,792

(1) The 2019 amount primarily related to the acquisition of Barbican.
(2) During the 2019 first quarter and 2018 second quarter, a subsidiary of the Company entered into two separate retroactive reinsurance transactions with third party reinsurers to reinsure run-off liabilities associated with certain U.S. insurance exposures.

2019 Prior Year Reserve Development

During 2019, the Company recorded estimated net favorable development on prior year loss reserves of $163.6 million, which consisted of net favorable development of $15.8 million from the insurance segment, $46.4 million from the reinsurance segment and $125.2 million from the mortgage segment, partially offset by $23.8 million of net adverse development from the 'other' segment.

The insurance segment's net favorable development of $15.8 million, or 7.0 points of net earned premium, consisted of $54.9 million of net favorable development from short-tailed lines and $39.1 million of net adverse development from medium-tailed and 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 all accident years, (i.e., the year in which a loss occurred) partially offset by net adverse development in travel business, primarily from the 2018 accident year. Net adverse development in medium-tailed and long-tailed lines of $39.1 million was primarily due to net adverse development of $33.6 million in contract binding business, primarily from the 2013 to 2017 accident years, and $30.1 million in programs, primarily from the 2014 and 2018 accident years. Such amounts were partially offset by net favorable development of $19.3 million in professional liability business, primarily from the 2013 to 2016 accident years, and $15.8 million in surety business, primarily from the 2014 to 2016 accident years.

The reinsurance segment's net favorable development of $46.4 million, or 3.2 points of net earned premium, consisted of $70.5 million of net favorable development from short-tailed lines and $16.0 million of net favorable development from medium-tailed lines, partially offset by $40.1 million of net adverse development from long-tailed lines. Favorable development in short-tailed lines included $33.7 million from property catastrophe and property other than property catastrophe reserves, primarily from the 2017 and 2018 underwriting years (i.e., losses attributable to contracts having an inception or renewal date within the given twelve-month period) and $40.8 million in other specialty, primarily from 2016 to 2018 underwriting years.The net reduction of loss estimates for the reinsurance segment's short-tailed lines primarily resulted from varying levels of reported and paid claims activity than previously anticipated which led to decreases in certain loss ratio selections during 2019. Net favorable development of $16.0 million in medium-tailed lines included reductions in marine and aviation reserves, primarily from the 2011 to 2017 underwriting years. Net adverse development in long-tailed lines of $40.1 million was primarily due to net adverse development of $44.5 million in casualty business, primarily from the 2013 to 2018 underwriting years.

The mortgage segment's net favorable development of $125.2 million, or 9.2 points of net earned premium, included $117.1 million of favorable development on U.S. primary mortgage business. Such development was primarily driven by continued lower than expected claim rates on first lien business and subrogation recoveries on second lien business.

2018 Prior Year Reserve Development

During 2018, the Company recorded estimated net favorable development on prior year loss reserves of $272.7 million, which consisted of $24.4 million from the insurance segment, $138.5 million from the reinsurance segment, $107.6 million from the mortgage segment and $2.2 million from the 'other' segment.

The insurance segment's net favorable development of $24.4 million, or 1.1 points of net earned premium, consisted of $48.4 million of net favorable development from short-tailed lines and $26.3 million of net favorable development from long-tailed lines, partially offset by $50.3 million of net adverse development from medium-tailed lines. Favorable development in short-tailed lines predominantly consisted of $50.1 million of net favorable development in property lines, primarily from the 2010 to 2017 accident years, partially offset by $5.0 million of adverse development on travel, accident and health business from the 2013 to 2017 accident years. Net favorable development in long-tailed lines of $26.3 million included $19.7 million of net favorable development on executive assurance business, primarily from the 2015 accident year, and $1.4 million of net favorable development in casualty business, primarily from the 2009 to 2015 accident years. Net adverse development in medium tailed lines of $50.3 million was primarily due to net adverse development in contract binding business for accident years 2013 to 2017.

The reinsurance segment's net favorable development of $138.5 million, or 11.0 points of net earned premium, consisted of $110.4 million from short-tailed lines and $28.1 million from medium-tailed and long-tailed lines. Favorable development in short-tailed lines included $80.8 million from property catastrophe and property other than property catastrophe reserves, primarily from the 2008 to 2017 underwriting years. The net reduction of loss estimates for the reinsurance segment's short-tailed lines primarily resulted from varying levels of reported and paid claims activity than previously anticipated which led to decreases in certain loss ratio selections during 2018. Net favorable development of $28.1 million in medium-tailed and long-tailed lines included reductions in casualty reserves of $12.5 million, primarily from the 2002 to 2010 underwriting years, and in marine and aviation reserves of $15.6 million, spread across most underwriting years.

The mortgage segment's net favorable development of $107.6 million, or 9.1 points of net earned premium, included $103.4 million of favorable development on U.S. primary mortgage business. Such development was primarily driven by continued lower than expected claim rates on first lien business and subrogation recoveries on second lien business.

2017 Prior Year Reserve Development

During 2017, the Company recorded estimated net favorable development on prior year loss reserves of $238.0 million, which consisted of $8.6 million from the insurance segment, $165.4 million from the reinsurance segment, and $95.0 million from the mortgage segment, less adverse development of $31.0 million from the 'other' segment.

The insurance segment's net favorable development of $8.6 million, or 4.0 points of net earned premium, consisted of $14.9 million of net favorable development from short-tailed lines and $11.8 million of net favorable development from long-tailed lines, partially offset by $18.1 million of net adverse development from medium-tailed lines. Favorable development in short-tailed lines predominantly consisted of $22.8 million of net favorable development in property lines, primarily from the 2011 to 2016 accident years, partially offset by $11.8 million of adverse development on travel, accident and health business from the 2014 to 2016 accident years. Net favorable development in long-tailed lines of $11.8 million included $10.0 million of net favorable development on executive assurance business, primarily from the 2013 accident year, and $8.3 million of net favorable development in casualty business, primarily from the 2007 to 2013 accident years. Net adverse development in medium-tailed lines of $18.1 million included $56.3 million of net adverse development in program business, primarily from the 2013 to 2015 accident years and primarily driven by a few inactive programs that were non-renewed in 2015 and early in 2016, partially offset by $36.2 million of net favorable development in professional liability business, primarily from the 2010 to 2016 accident years.

The reinsurance segment's net favorable development of $165.4 million, or 14.5 points of net earned premium, consisted of $101.0 million from short-tailed lines and $64.4 million from medium-tailed and long-tailed lines. Favorable development in short-tailed lines included $82.6 million from property catastrophe and property other than property catastrophe reserves, primarily from the 2009 to 2016 underwriting years.

The net reduction of loss estimates for the reinsurance segment's short-tailed lines primarily resulted from varying levels of reported and paid claims activity than previously anticipated which led to decreases in certain loss ratio selections during 2017. Net favorable development of $64.4 million in medium-tailed and long-tailed lines included reductions in casualty reserves of $43.7 million, primarily from the 2002 to 2013 underwriting years, and in marine and aviation reserves of $19.6 million, spread across most underwriting years.

The mortgage segment's net favorable development of $95.0 million, or 9.0 points of net earned premium, for 2017, included $89.3 million of favorable development on U.S. primary mortgage business. Such development was primarily driven by continued lower than expected claim rates on first lien business and subrogation recoveries on second lien business.

6. Short Duration Contracts

The Company's reserves for losses and loss adjustment expenses primarily relate to short-duration contracts with various characteristics (*e.g.*, type of coverage, geography, claims duration). The Company considered such information in determining the level of disaggregation for disclosures related to its short-duration contracts, as detailed in the table below:

Reportable segment	Level of disaggregation	Included lines of business
Insurance	Property energy, marine and aviation	Property energy, marine and aviation
	Third party occurrence business	Excess and surplus casualty (excluding contract binding); construction and national accounts; and other (including alternative market risks, excess workers' compensation and employer's liability insurance coverages)
	Third party claims-made business	Professional lines
	Multi-line and other specialty	Programs; contract binding (part of excess and surplus casualty); travel, accident and health; lenders products; and other (contract and commercial surety coverages)
Reinsurance	Casualty	Casualty
	Property catastrophe	Property catastrophe
	Property excluding property catastrophe	Property excluding property catastrophe
	Marine and aviation	Marine and aviation
	Other specialty	Other specialty
Mortgage	Direct mortgage insurance in the U.S.	Mortgage insurance on U.S. primary exposures

The Company determined the following to be insignificant for disclosure purposes: (i) amounts included in the 'other' segment (*i.e.*, Watford) as described in note 11, "Variable Interest Entity and Noncontrolling Interests"; (ii) certain mortgage business, including non-U.S. primary business, second lien and student loan exposures, global mortgage reinsurance and participation in various GSE credit risk-sharing products; (iii) certain reinsurance business, including casualty clash and non-traditional lines, and (iv) amounts associated with the Barbican acquisition. Such amounts are included as reconciling items.

The Company is required to establish reserves for losses and loss adjustment expenses ("Loss Reserves") that arise from the business the Company underwrites. Loss Reserves for the insurance, reinsurance and mortgage segments represent estimates of future amounts required to pay losses and loss adjustment expenses for insured or reinsured events which have occurred at or before the balance sheet date. Loss Reserves do not reflect contingency reserve allowances to account for future loss occurrences. Losses arising from future events will be estimated and recognized at the time the losses are incurred and could be substantial.

Insurance Segment

Loss Reserves for the insurance segment are comprised of estimated amounts for (1) reported losses ("case reserves") and (2) incurred but not reported losses ("IBNR reserves"). Generally, claims personnel determine whether to establish a case reserve for the estimated amount of the ultimate settlement of individual claims. The estimate reflects the judgment of claims personnel based on general corporate reserving practices, the experience and knowledge of such personnel regarding the nature and value of the specific type of claim and, where appropriate, advice of counsel. The Company also contracts with a number of outside third party administrators in the claims process who, in certain cases, have limited authority to establish case reserves. The work of such administrators is reviewed and monitored by our claims personnel. Loss Reserves are also established to provide for loss adjustment expenses and represent the estimated expense of settling claims, including legal and other fees and the general expenses of administering the claims adjustment process. Periodically, adjustments to the case reserves may be made as additional information is reported or payments are made. IBNR reserves are established to provide for incurred claims which have not yet been reported at the balance sheet date as well as to adjust for any projected variance in case reserving. Actuaries estimate ultimate losses and loss adjustment expenses using various generally accepted actuarial methods applied to known losses and other relevant information. Like case reserves, IBNR reserves are adjusted as additional information becomes known or payments are made. The process of estimating reserves involves a considerable degree of judgment by management and, as of any given date, is inherently uncertain.

Ultimate losses and loss adjustment expenses are generally determined by extrapolation of claim emergence and settlement patterns observed in the past that can reasonably be expected to persist into the future. In forecasting ultimate losses and loss adjustment expenses with respect to any line of business, past experience with respect to that line of business is the primary resource, developed through both industry and company experience, but cannot be relied upon in isolation. Uncertainties in estimating ultimate losses and loss adjustment expenses are magnified by the length of the time lag between when a claim actually occurs and when it is reported and settled. This time lag is sometimes referred to as the "claim-tail." During this period additional facts regarding coverages written in prior accident years, as well as about actual claims and trends, may become known and, as a result, may lead to adjustments of the related Loss Reserves. If the Company determines that an adjustment is appropriate, the adjustment is recorded in the accounting period in which such determination is made. Accordingly, should Loss Reserves need to be increased or decreased in the future from amounts currently established, future results of operations would be negatively or positively impacted respectively. The Company authorizes managing general agents, general agents and other producers to write program business on the Company's behalf within prescribed underwriting authorities. This delegated authority process introduces additional complexity to the actuarial determination of unpaid future losses and loss adjustment expenses. In order to monitor adherence to the underwriting guidelines given to such parties, the Company periodically performs underwriting and claims due diligence reviews.

In determining ultimate losses and loss adjustment expenses, the cost to indemnify claimants, provide needed legal defense and other services for insureds and administer the investigation and adjustment of claims are considered. These claim costs are influenced by many factors that change over time, such as expanded coverage definitions as a result of new court decisions, inflation in costs to repair or replace damaged property, inflation in the cost of medical services and legislated changes in statutory benefits, as well as by the particular, unique facts that pertain to each claim. As a result, the rate at which claims arose in the past and the costs to settle them may not always be representative of what will occur in the future. The factors influencing changes in claim costs are often difficult to isolate or quantify and developments in paid and incurred losses from historical trends are frequently subject to multiple and conflicting interpretations. Changes in coverage terms or claims handling practices may also cause future experience and/or development patterns to vary from the past. A key objective of actuaries in developing estimates of ultimate losses and loss adjustment expenses, and resulting IBNR reserves, is to identify aberrations and systemic changes occurring within historical experience and adjust for them so that the future can be projected more reliably. Because of the factors previously discussed, this process requires the substantial use of informed judgment and is inherently uncertain.

Although Loss Reserves are initially determined based on underwriting and pricing analyses, the Company's insurance segment applies several generally accepted actuarial methods, as discussed below, on a quarterly basis to evaluate the Loss Reserves, in addition to the expected loss method, in particular for Loss Reserves from more mature accident years (the year in which a loss occurred). Each quarter, as part of the reserving process, the segments' actuaries reaffirm that the assumptions used in the reserving process continue to form a sound basis for the projection of liabilities. If actual loss activity differs substantially from expectations based on historical information, an adjustment to Loss Reserves may be supported. The Company places more or less reliance on a particular actuarial method based on the facts and circumstances at the time the estimates of Loss Reserves are made.

These methods generally fall into one of the following categories or are hybrids of one or more of the following categories:

- *Expected loss methods* - these methods are based on the assumption that ultimate losses vary proportionately with premiums. Expected loss and loss adjustment expense ratios are typically developed based upon the information derived by underwriters and actuaries during the initial pricing of the business, supplemented by industry data available from organizations, such as statistical bureaus and consulting firms, where appropriate. These ratios consider, among other things, rate increases and changes in terms and conditions that have been observed in the market. Expected loss methods are useful for estimating ultimate losses and loss adjustment expenses in the early years of long-tailed lines of business, when little or no paid or incurred loss information is available, and is commonly applied when limited loss experience exists for a company.

- *Historical incurred loss development methods* - these methods assume that the ratio of losses in one period to losses in an earlier period will remain constant in the future. These methods use incurred losses (*i.e.*, the sum of cumulative historical loss payments plus outstanding case reserves) over discrete periods of time to estimate future losses. Historical incurred loss development methods may be preferable to historical paid loss development methods because they explicitly take into account open cases and the claims adjusters' evaluations of the cost to settle all known claims. However, historical incurred loss development methods necessarily assume that case reserving practices are consistently applied over time. Therefore, when there have been significant changes in how case reserves are established, using incurred loss data to project ultimate losses may be less reliable than other methods.

- *Historical paid loss development methods* - these methods, like historical incurred loss development methods, assume that the ratio of losses in one period to losses in an earlier period will remain constant. These methods use historical loss payments over discrete periods of time to estimate future losses and necessarily assume that factors that have affected paid losses in the past, such as inflation or the effects of litigation, will remain constant in the future. Because historical paid loss development methods do not use incurred losses to estimate ultimate losses, they may be more reliable than the other methods that use incurred losses in situations where there are significant changes in how incurred losses are established by a company's claims adjusters. However, historical paid loss development methods are more leveraged (meaning that small changes in payments have a larger impact on estimates of ultimate losses) than actuarial methods that use incurred losses because cumulative loss payments take much longer to equal the expected ultimate losses than cumulative incurred amounts. In addition, and for similar reasons, historical paid loss development methods are often slow to react to situations when new or different factors arise than those that have affected paid losses in the past.

- *Adjusted historical paid and incurred loss development methods* - these methods take traditional historical paid and incurred loss development methods and adjust them for the estimated impact of changes from the past in factors such as inflation, the speed of claim payments or the adequacy of case reserves. Adjusted historical paid and incurred loss development methods are often more reliable methods of predicting ultimate losses in periods of significant change, provided the actuaries can develop methods to reasonably quantify the impact of changes. As such, these methods utilize more judgment than historical paid and incurred loss development methods.
- *Bornhuetter-Ferguson ("B-F") paid and incurred loss methods* - these methods utilize actual paid and incurred losses and expected patterns of paid and incurred losses, taking the initial expected ultimate losses into account to determine an estimate of expected ultimate losses. The B-F paid and incurred loss methods are useful when there are few reported claims and a relatively less stable pattern of reported losses.
- *Frequency-Severity methods* - These methods utilize actual paid and incurred claim experience, but break the data down into its component pieces: claim counts, often expressed as a ratio to exposure or premium (frequency), and average claim size (severity). The component pieces are projected to an ultimate level and multiplied together to result in an estimate of ultimate loss. These methods are especially useful when the severity of claims can be confined to a relatively stable range of estimated ultimate average claim value.
- *Additional analyses* - other methodologies are often used in the reserving process for specific types of claims or events, such as catastrophic or other specific major events. These include vendor catastrophe models, which are typically used in the estimation of Loss Reserves at the early stage of known catastrophic events before information has been reported to an insurer or reinsurer.

In the initial reserving process for short-tail insurance lines (consisting of property, energy, marine and aviation and other exposures including travel, accident and health and lenders products), the Company relies on a combination of the reserving methods discussed above. For catastrophe-exposed business, the reserving process also includes the usage of catastrophe models for known events and a heavy reliance on analysis of individual catastrophic events and management judgment. The development of losses on short-tail business can be unstable, especially for policies characterized by high severity, low frequency losses. As time passes, for a given accident year, additional weight is given to the paid and incurred B-F loss development methods and eventually to the historical paid and incurred loss development methods in the reserving process. The Company makes a number of key assumptions in their reserving process, including that historical paid and reported development patterns are stable, catastrophe models provide useful information about our exposure to catastrophic events that have occurred and underwriters' judgment as to potential loss exposures can be relied on. The expected loss ratios used in the initial reserving process for short-tail business have varied over time due to changes in pricing, reinsurance structure, estimates of catastrophe losses, policy changes (such as attachment points, class and limits) and geographical distribution. As losses in short-tail lines are reported relatively quickly, expected loss ratios are selected for the current accident year based upon actual attritional loss ratios for earlier accident years, adjusted for rate changes, inflation, changes in reinsurance programs and expected attritional losses based on modeling. Furthermore, ultimate losses for short-tail business are known in a reasonably short period of time.

In the initial reserving process for medium-tail and long-tail insurance lines (consisting of third party occurrence business, third party claims made business, and other exposures including surety, programs and contract binding exposures), the Company primarily relies on the expected loss method. The development of the Company's medium-tail and long-tail business may be unstable, especially if there are high severity major events, as a portion of the Company's casualty business is in high excess layers. As time passes, for a given accident year, additional weight is given to the paid and incurred B-F loss development methods and historical paid and incurred loss development methods in the reserving process. The Company makes a number of key assumptions in reserving for medium-tail and long-tail lines, including that the pricing loss ratio is the best estimate of the ultimate loss ratio at the time the policy is entered into, that the loss development patterns, which are based on a combination of company and industry loss development patterns and adjusted to reflect differences in the insurance segment's mix of business, are reasonable and that claims personnel and underwriters analyses of our exposure to major events are assumed to be the best estimate of exposure to the known claims on those events. The expected loss ratios used in the initial reserving process for medium-tail and long-tail business for recent accident years have varied over time, in some cases significantly, from earlier accident years. As the credibility of historical experience for earlier accident years increases, the experience from these accident years will be given a greater weighting in the actuarial analysis to determine future accident year expected loss ratios, adjusted for changes in pricing, loss trends, terms and conditions and reinsurance structure.

In 2019 and 2018, the Company entered into two separate loss portfolio transfers and adverse development cover reinsurance agreements accounted for as retroactive reinsurance. These agreements transfer Loss Reserves and future favorable or adverse development on certain runoff programs and other exposures within multi-line and other specialty business, and certain third party occurrence business (the "Covered Lines"). As incurred losses and allocated loss adjustment expenses for the Covered Lines are ceded to the reinsurer, the Company is not exposed to changes in the amount, timing and uncertainty of cash flows arising from the Covered Lines. To avoid distortion, the incurred losses and allocated loss adjustment expenses and cumulative paid losses and loss adjustment expenses for the Covered Lines are excluded entirely from the tables below. Reinsurance recoverables at December 31, 2019 included $319.3 million related to these reinsurance agreements.

The following tables present information on the insurance segment's short-duration insurance contracts:

Property, energy, marine and aviation ($000's except claim count)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 197,399	$ 187,305	$ 151,937	$ 139,757	$ 128,475	$ 128,799	$ 127,530	$ 124,974	$ 120,813	$ 118,570	$ 1,310	3,676
2011		266,725	269,790	229,244	217,753	208,494	205,344	198,763	198,956	198,370	868	4,219
2012			230,399	229,820	203,408	197,187	194,746	190,930	188,649	178,394	2,487	4,266
2013				156,936	154,313	146,777	140,967	132,839	132,211	128,247	752	4,279
2014					146,391	143,825	145,065	134,055	133,482	129,973	6,769	3,930
2015						110,867	108,260	102,535	102,221	97,361	5,669	4,613
2016							102,910	99,899	104,246	100,542	560	6,388
2017								278,549	247,072	235,152	14,830	6,744
2018									185,486	179,262	29,117	5,333
2019										161,850	59,863	5,688
									Total	$ 1,527,721		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 28,433	$ 65,846	$ 87,476	$ 105,887	$ 110,892	$ 117,737	$ 119,953	$ 118,437	$ 119,276	$ 116,822
2011		34,002	98,616	140,555	165,950	198,128	199,943	195,613	196,272	196,056
2012			20,301	92,034	137,179	159,862	165,488	177,945	179,138	173,058
2013				31,874	83,689	109,088	118,131	120,385	123,392	123,696
2014					25,620	53,060	76,774	83,080	86,518	99,041
2015						23,271	63,990	75,340	84,964	88,433
2016							24,442	82,357	97,147	97,674
2017								29,915	138,525	196,290
2018									29,641	102,798
2019										26,014
									Total	1,219,882
									All outstanding liabilities before 2010, net of reinsurance	32,875
									Liabilities for losses and loss adjustment expenses, net of reinsurance	$ 340,714

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

Third party occurrence business ($000's except claim count)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 217,431	$ 235,241	$ 230,710	$ 230,859	$ 233,204	$ 229,534	$ 223,618	$ 215,332	$ 218,374	$ 211,046	$ 33,176	62,757
2011		233,958	240,406	253,691	258,348	252,227	253,598	246,721	239,395	233,563	44,601	71,101
2012			240,917	262,373	267,980	270,603	257,059	252,497	242,648	242,454	60,258	65,806
2013				282,629	296,492	306,358	301,403	281,437	275,101	271,116	74,749	66,990
2014					329,448	335,281	338,194	342,455	340,408	341,595	98,049	75,526
2015						358,478	391,198	398,185	394,268	388,744	146,656	77,727
2016							389,333	393,991	406,785	397,914	193,182	77,100
2017								416,856	419,456	421,414	254,057	82,458
2018									434,854	450,950	315,814	74,221
2019										454,723	390,054	62,988
									Total	$3,413,519		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 6,753	$ 25,511	$ 45,550	$ 72,696	$ 102,391	$ 117,250	$ 132,818	$ 142,380	$ 148,140	$ 158,370
2011		7,006	25,142	43,309	73,268	113,283	134,342	152,472	160,326	171,744
2012			6,962	30,799	58,387	83,193	108,087	129,369	142,932	153,263
2013				6,842	29,214	71,328	101,148	122,043	148,951	162,910
2014					9,204	40,232	71,397	112,434	161,780	188,871
2015						11,112	44,522	88,383	139,283	179,435
2016							11,684	41,893	87,424	135,617
2017								13,392	52,283	99,225
2018									16,994	62,762
2019										18,202
									Total	1,330,399
					All outstanding liabilities before 2010, net of reinsurance					181,719
					Liabilities for losses and loss adjustment expenses, net of reinsurance					$2,264,839

Third party claims-made business ($000's except claim count)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 286,202	$ 311,709	$ 332,779	$ 338,238	$ 331,006	$ 314,388	$ 298,444	$ 280,497	$ 283,530	$ 284,427	$ 8,775	12,335
2011		281,448	323,369	314,961	309,684	315,118	294,367	281,487	284,242	279,909	14,003	11,762
2012			309,654	312,143	310,359	305,362	283,903	268,765	271,663	272,826	17,820	14,759
2013				295,759	313,601	317,165	313,738	288,506	286,280	271,290	29,604	14,542
2014					260,698	275,172	293,467	273,876	278,182	287,424	42,805	13,935
2015						254,540	272,413	271,343	257,902	246,366	43,026	13,815
2016							270,537	286,677	306,837	304,266	81,707	15,716
2017								266,526	284,875	300,710	131,795	15,904
2018									272,655	301,247	177,552	14,934
2019										271,824	224,119	9,698
									Total	$2,820,289		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 13,811	$ 70,583	$ 127,531	$ 162,490	$ 197,142	$ 213,530	$ 229,824	$ 233,085	$ 241,887	$ 252,119
2011		13,510	71,038	128,011	171,354	204,215	223,458	235,181	248,524	259,416
2012			17,307	67,314	117,891	160,480	185,656	204,240	221,391	240,281
2013				18,557	85,442	134,509	175,328	193,704	212,488	230,377
2014					13,572	62,308	127,683	170,331	204,330	223,907
2015						8,845	51,064	98,371	124,381	168,664
2016							10,371	67,446	125,740	156,030
2017								9,180	66,582	111,532
2018									12,123	67,567
2019										11,443
									Total	1,721,336
					All outstanding liabilities before 2010, net of reinsurance					126,168
					Liabilities for losses and loss adjustment expenses, net of reinsurance					$1,225,121

Multi-line and other specialty ($000's except claim count)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 173,984	$ 176,796	$ 169,307	$ 166,892	$ 158,092	$ 154,716	$ 153,526	$ 153,598	$ 151,951	$ 150,342	$ 2,508	37,891
2011		182,372	187,924	182,213	175,794	171,923	171,691	168,243	169,851	169,467	3,097	44,881
2012			252,699	263,326	257,420	255,055	254,155	246,077	246,482	243,042	4,255	55,403
2013				263,349	271,603	262,837	263,097	251,187	252,713	247,659	7,096	71,701
2014					300,962	324,736	317,210	317,161	316,047	312,400	11,578	109,295
2015						333,519	356,543	355,484	363,627	355,095	17,097	147,950
2016							406,309	428,530	425,281	413,668	25,881	173,735
2017								479,694	498,860	488,276	46,435	217,360
2018									573,827	621,724	123,652	243,725
2019										604,356	299,028	169,915
									Total	$3,606,029		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 49,906	$ 91,265	$ 111,143	$ 125,897	$ 135,981	$ 140,372	$ 143,459	$ 146,357	$ 146,482	$ 146,413
2011		51,145	102,910	117,372	136,078	147,466	151,126	156,619	158,902	161,887
2012			78,178	165,305	189,330	208,372	222,024	230,929	232,064	235,461
2013				86,403	150,432	179,785	212,713	224,665	233,572	235,784
2014					107,529	196,081	232,950	265,927	279,950	290,702
2015						137,561	235,193	276,608	304,464	319,788
2016							174,366	302,470	339,125	360,602
2017								179,777	339,753	378,500
2018									213,065	399,443
2019										213,559
									Total	2,742,139
						All outstanding liabilities before 2010, net of reinsurance				23,337
						Liabilities for losses and loss adjustment expenses, net of reinsurance				$ 887,227

The following table presents the average annual percentage payout of incurred losses and allocated loss adjustment expenses by age, net of reinsurance, as of December 31, 2019:

	Average annual percentage payout of incurred losses and allocated loss adjustment expenses by age, net of reinsurance									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Property, energy, marine and aviation	19.1%	39.1%	19.2%	9.1%	5.3%	5.1%	0.1%	(1.5)%	0.3%	(2.1)%
Third party occurrence business	3.1%	8.8%	10.9%	12.0%	12.3%	8.5%	6.5%	4.1 %	3.8%	4.8 %
Third party claims-made business	4.6%	19.3%	19.1%	13.4%	11.6%	6.6%	5.7%	4.3 %	3.5%	3.6 %
Multi-line and other specialty	35.2%	29.9%	10.5%	9.4%	5.4%	3.2%	1.7%	1.6 %	0.9%	— %

Reinsurance Segment

Loss Reserves for the Company's reinsurance segment are comprised of (1) case reserves, (2) additional case reserves ("ACRs") and (3) IBNR reserves. The Company receives reports of claims notices from ceding companies and records case reserves based upon the amount of reserves recommended by the ceding company. Case reserves may be supplemented by ACRs, which may be estimated by the Company's claims personnel ahead of official notification from the ceding company, or when judgment regarding the size or severity of the known event differs from the ceding company. In certain instances, the Company establishes ACRs even when the ceding company does not report any liability on a known event. In addition, specific claim information reported by ceding companies or obtained through claim audits can alert the Company to emerging trends such as changing legal interpretations of coverage and liability, claims from unexpected sources or classes of business, and significant changes in the frequency or severity of individual claims. Such information is often used in the process of estimating IBNR reserves. IBNR reserves are established to provide for incurred claims which have not yet been reported at the balance sheet date as well as to adjust for any projected variance in case reserving. Actuaries estimate ultimate losses and loss adjustment expenses using various generally accepted actuarial methods applied to known losses and other relevant information. Like case reserves, IBNR reserves are adjusted as additional information becomes known or payments are made. The process of estimating Loss Reserves involves a considerable degree of judgment by management and, as of any given date, is inherently uncertain.

The estimation of Loss Reserves for the reinsurance segment is subject to the same risk factors as the estimation of Loss Reserves for the insurance segment. In addition, the inherent uncertainties of estimating such reserves are even greater for reinsurers, due primarily to the following factors: (1) the claim-tail for reinsurers is generally longer because claims are first reported to the ceding company and then to the reinsurer through one or more intermediaries, (2) the reliance on premium estimates, where reports have not been received from the ceding company, in the reserving process, (3) the potential for writing a number of reinsurance contracts with different ceding companies with the same exposure to a single loss event, (4) the diversity of loss development patterns among different types of reinsurance contracts, (5) the necessary reliance on the ceding companies for information regarding reported claims and (6) the differing reserving practices among ceding companies.

Ultimate losses and loss adjustment expenses are generally determined by extrapolation of claim emergence and settlement patterns observed in the past that can reasonably be expected to persist into the future.As with the insurance segment, the process of estimating Loss Reserves for the reinsurance segment involves a considerable degree of judgment by management and, as of any given date, is inherently uncertain. As discussed above, such uncertainty is greater for reinsurers compared to insurers. As a result, our reinsurance operations obtain information from numerous sources to assist in the process. Pricing actuaries from the reinsurance segment devote considerable effort to understanding and analyzing a ceding company's operations and loss history during the underwriting of the business, using a combination of ceding company and industry statistics. Such statistics normally include historical premium and loss data by class of business, individual claim information for larger claims, distributions of insurance limits provided, loss reporting and payment patterns, and rate change history. This analysis is used to project expected loss ratios for each treaty during the upcoming contract period.

As mentioned above, there can be a considerable time lag from the time a claim is reported to a ceding company to the time it is reported to the reinsurer. The lag can be several years in some cases and may be attributed to a number of reasons, including the time it takes to investigate a claim, delays associated with the litigation process, the deterioration in a claimant's physical condition many years after an accident occurs, the case reserving approach of the ceding company, etc. In the reserving process, the Company assumes that such lags are predictable, on average, over time and therefore the lags are contemplated in the loss reporting patterns used in their actuarial methods. This means that the reinsurance segment must rely on estimates for a longer period of time than does an insurance company. Backlogs in the recording of assumed reinsurance can also complicate the accuracy of loss reserve estimation. As of December 31, 2019 there were no significant backlogs related to the processing of assumed reinsurance information at our reinsurance operations.

The reinsurance segment relies heavily on information reported by ceding companies, as discussed above. In order to determine the accuracy and completeness of such information, underwriters, actuaries, and claims personnel often perform audits of ceding companies and regularly review information received from ceding companies for unusual or unexpected results. Material findings are usually discussed with the ceding companies. The Company sometimes encounters situations where they determine that a claim presentation from a ceding company is not in accordance with contract terms. In these situations, the Company attempts to resolve the dispute with the ceding company. Most situations are resolved amicably and without the need for litigation or arbitration. However, in the infrequent situations where a resolution is not possible, the Company will vigorously defend its position in such disputes.

Although Loss Reserves are initially determined based on underwriting and pricing analysis, the Company applies several generally accepted actuarial methods, as discussed above, on a quarterly basis to evaluate its Loss Reserves in addition to the expected loss method, in particular for reserves from more mature underwriting years (the year in which business is underwritten). Each quarter, as part of the reserving process, the Company's actuaries reaffirm that the assumptions used in the reserving process continue to form a sound basis for projection of liabilities. If actual loss activity differs substantially from expectations based on historical information, an adjustment to Loss Reserves may be supported. Estimated Loss Reserves for more mature underwriting years are now based more on actual loss activity and historical patterns than on the initial assumptions based on pricing indications. More recent underwriting years rely more heavily on internal pricing assumptions. The Company places more or less reliance on a particular actuarial method based on the facts and circumstances at the time the estimates of Loss Reserves are made.

In the initial reserving process for short-tail reinsurance lines (consisting of property excluding property catastrophe and property catastrophe exposures), the Company relies on a combination of the reserving methods discussed above. For known catastrophic events, the reserving process also includes the usage of catastrophe models and a heavy reliance on analysis which includes ceding company inquiries and management judgment. The development of property losses may be unstable, especially where there is high catastrophic exposure, may be characterized by high severity, low frequency losses for excess and catastrophe-exposed business and may be highly correlated across contracts. As time passes, for a given underwriting year, additional weight is given to the paid and incurred B-F loss development methods and historical paid and incurred loss development methods in the reserving process. The Company makes a number of key assumptions in reserving for short-tail lines, including that historical paid and reported development patterns are stable, catastrophe models provide useful information about our exposure to catastrophic events that have occurred and our underwriters' judgment and guidance received from ceding companies as to potential loss exposures may be relied on. The expected loss ratios used in the initial reserving process for property exposures have varied over time due to changes in pricing, reinsurance structure, estimates of catastrophe losses, terms and conditions and geographical distribution. As losses in property lines are reported relatively quickly, expected loss ratios are selected for the current underwriting year incorporating the experience for earlier underwriting years, adjusted for rate changes, inflation, changes in reinsurance programs, expectations about present and future market conditions and expected attritional losses based on modeling. Due to the short-tail nature of property business, reported loss experience emerges quickly and ultimate losses are known in a reasonably short period of time.

In the initial reserving process for medium-tail and long-tail reinsurance lines (consisting of casualty, other specialty, marine and aviation and other exposures), the Company primarily relies on the expected loss method. The development of medium-tail and long-tail business may be unstable, especially if there are high severity major events, with business written on an excess of loss basis typically having a longer tail than business written on a pro rata basis. As time passes, for a given underwriting year, additional weight is given to the paid and incurred B-F loss development methods and eventually to the historical paid and incurred loss development methods in the reserving process. Our reinsurance operations make a number of key assumptions in reserving for medium-tail and long-tail lines, including that the pricing loss ratio is the best estimate of the ultimate loss ratio at the time the contract is entered into, historical paid and reported development patterns are stable and claims personnel and underwriters' analyses of our exposure to major events are our best estimate of our exposure to the known claims on those events. The expected loss ratios used in our reinsurance operations' initial reserving process for medium-tail and long-tail contracts have varied over time due to changes in pricing, terms and conditions and reinsurance structure. As the credibility of historical experience for earlier underwriting years increases, the experience from these underwriting years is used in the actuarial analysis to determine future underwriting year expected loss ratios, adjusted for changes in pricing, loss trends, terms and conditions and reinsurance structure.

The following tables present information on the reinsurance segment's short-duration insurance contracts:

Casualty ($000's)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 189,406	$ 190,639	$ 193,935	$ 185,429	$ 175,107	$ 164,530	$ 158,797	$ 154,969	$ 149,360	$ 145,012	$ 22,988	N/A
2011		149,186	152,793	146,786	141,854	137,580	134,486	128,535	125,712	127,056	23,269	N/A
2012			142,523	140,694	136,540	124,626	114,660	109,376	118,026	121,306	32,311	N/A
2013				165,465	158,693	154,478	148,223	136,163	134,615	130,954	39,769	N/A
2014					216,073	221,252	218,392	232,303	228,802	238,510	52,506	N/A
2015						222,008	220,835	229,481	236,743	240,762	65,978	N/A
2016							213,803	226,214	249,540	264,406	73,050	N/A
2017								264,219	250,550	265,751	78,119	N/A
2018									278,129	292,526	167,212	N/A
2019										326,258	254,304	N/A
									Total	$2,152,541		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 2,135	$ 20,781	$ 37,608	$ 51,467	$ 69,362	$ 79,732	$ 90,611	$ 98,414	$ 106,944	$ 108,584
2011		2,300	11,403	21,541	38,315	54,298	63,712	70,578	75,747	81,596
2012			1,294	8,458	14,648	25,468	36,497	47,732	59,423	69,776
2013				2,466	9,902	22,998	43,009	54,496	63,035	70,674
2014					3,912	16,038	40,763	63,376	90,965	114,226
2015						4,457	20,254	47,198	70,956	96,592
2016							5,735	25,643	51,641	86,681
2017								6,425	29,376	59,262
2018									7,579	31,572
2019										16,101
									Total	735,064
	All outstanding liabilities before 2010, net of reinsurance									290,219
	Liabilities for losses and loss adjustment expenses, net of reinsurance									$1,707,696

Property catastrophe ($000's)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 92,632	$ 47,218	$ 38,916	$ 38,823	$ 42,333	$ 42,732	$ 42,535	$ 42,738	$ 42,544	$ 43,500	$ —	N/A
2011		203,903	183,897	165,402	152,784	148,956	148,230	146,028	141,950	140,905	—	N/A
2012			149,918	122,948	108,624	102,158	99,931	99,118	97,084	97,192	164	N/A
2013				66,695	47,409	36,133	31,664	29,119	28,400	27,532	(125)	N/A
2014					44,896	30,625	25,114	22,263	20,527	19,822	(10)	N/A
2015						32,159	16,787	10,497	4,546	2,715	184	N/A
2016							23,411	16,786	13,044	9,370	639	N/A
2017								78,418	45,467	42,594	(3,620)	N/A
2018									72,769	59,033	4,671	N/A
2019										43,497	15,329	N/A
									Total	$ 486,160		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 8,464	$ 23,406	$ 31,371	$ 37,332	$ 38,527	$ 40,092	$ 41,357	$ 41,411	$ 41,593	$ 41,901
2011		59,545	82,065	113,275	127,960	133,439	135,928	137,967	138,355	138,911
2012			25,850	70,836	83,869	90,774	92,933	94,062	94,672	95,359
2013				12,126	19,095	23,872	25,704	27,450	27,690	27,694
2014					13,657	19,823	18,280	19,108	18,699	18,892
2015						(3,689)	(3,422)	784	1,044	569
2016							(7,324)	1,331	1,593	2,778
2017								28,735	27,463	31,558
2018									25,481	11,872
2019										3,903
									Total	373,437
					All outstanding liabilities before 2010, net of reinsurance					330
					Liabilities for losses and loss adjustment expenses, net of reinsurance					$ 113,053

Property excluding property catastrophe ($000's)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 142,466	$ 128,147	$ 117,919	$ 112,249	$ 110,319	$ 108,188	$ 104,403	$ 101,224	$ 100,442	$ 99,299	$ 821	N/A
2011		206,803	179,479	166,987	163,262	159,117	157,811	155,539	154,519	153,198	1,531	N/A
2012			156,087	121,698	123,613	119,040	114,617	112,398	110,927	108,374	850	N/A
2013				115,375	76,856	70,499	66,121	64,397	63,616	62,423	787	N/A
2014					143,307	117,304	99,198	90,708	88,436	84,134	3,430	N/A
2015						213,740	188,293	183,977	188,219	187,493	13,082	N/A
2016							176,017	145,251	137,493	136,298	19,522	N/A
2017								256,757	239,608	226,555	21,691	N/A
2018									222,345	240,094	31,217	N/A
2019										213,206	94,880	N/A
									Total	$1,511,074		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 37,776	$ 76,429	$ 88,196	$ 93,354	$ 95,571	$ 96,718	$ 97,363	$ 97,793	$ 97,733	$ 97,842
2011		47,605	121,234	141,120	145,621	147,675	148,777	149,019	149,291	150,305
2012			26,109	77,957	93,165	101,831	102,801	103,435	102,612	102,552
2013				25,955	42,669	49,753	52,931	53,730	55,609	61,118
2014					23,500	62,790	71,691	76,632	78,271	78,659
2015						75,325	118,655	149,122	160,029	165,186
2016							33,282	94,875	98,708	104,085
2017								25,258	116,304	145,172
2018									29,478	107,496
2019										45,380
									Total	1,057,795
					All outstanding liabilities before 2010, net of reinsurance					5,302
					Liabilities for losses and loss adjustment expenses, net of reinsurance					$ 458,581

Marine and aviation ($000's)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 40,973	$ 42,297	$ 38,520	$ 35,428	$ 33,524	$ 31,910	$ 31,160	$ 30,331	$ 28,521	$ 28,347	$ 32	N/A
2011		39,323	32,910	35,848	32,405	28,785	27,188	27,253	24,863	23,783	1,541	N/A
2012			59,013	58,857	55,027	52,261	51,053	49,697	46,019	43,000	4,052	N/A
2013				39,025	37,841	36,796	35,364	35,265	34,528	34,084	8,204	N/A
2014					30,949	29,140	27,334	25,633	23,635	23,270	6,819	N/A
2015						33,831	37,614	31,831	31,770	30,822	5,769	N/A
2016							27,366	22,752	23,569	19,279	10,917	N/A
2017								28,796	26,342	23,806	10,283	N/A
2018									28,164	26,206	13,754	N/A
2019										39,801	23,090	N/A
									Total	$ 292,398		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 8,523	$ 13,402	$ 16,752	$ 18,478	$ 20,220	$ 26,535	$ 27,182	$ 27,544	$ 27,119	$ 27,118
2011		4,420	12,121	16,529	19,231	15,952	16,626	21,979	21,903	21,965
2012			2,657	11,434	27,518	33,294	35,033	36,232	37,719	38,010
2013				4,932	13,845	18,511	21,500	22,510	23,778	24,155
2014					4,151	7,946	11,538	12,410	14,583	15,016
2015						5	13,436	19,052	20,888	22,663
2016							(7,317)	(1,676)	523	3,258
2017								1,657	6,516	9,339
2018									2,001	7,015
2019										9,074
									Total	177,613
							All outstanding liabilities before 2010, net of reinsurance			17,110
							Liabilities for losses and loss adjustment expenses, net of reinsurance			$ 131,895

Other specialty ($000's)

	Incurred losses and allocated loss adjustment expenses, net of reinsurance										December 31, 2019	
	Year ended December 31,											
Accident year	2010 unaudited	2011 unaudited	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of reported claims
2010	$ 43,160	$ 32,881	$ 26,070	$ 23,827	$ 22,821	$ 22,461	$ 22,222	$ 21,990	$ 21,382	$ 21,171	$ 670	N/A
2011		112,256	97,229	93,206	91,553	89,670	88,313	87,708	85,812	86,232	2,679	N/A
2012			221,101	210,448	200,482	194,895	192,692	195,632	193,811	188,044	12,317	N/A
2013				251,978	225,620	215,711	212,088	213,089	210,698	210,201	15,212	N/A
2014					275,419	256,819	258,738	251,960	246,896	248,573	19,791	N/A
2015						210,183	201,558	199,726	196,972	197,337	24,609	N/A
2016							223,625	221,177	215,354	210,053	26,895	N/A
2017								275,721	265,098	255,873	44,453	N/A
2018									333,228	328,750	80,916	N/A
2019										372,747	170,179	N/A
									Total	$2,118,981		

	Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance									
2010	$ 4,049	$ 13,424	$ 16,559	$ 17,584	$ 18,366	$ 18,943	$ 19,165	$ 19,783	$ 19,802	$ 19,818
2011		28,875	57,832	69,981	74,604	78,073	79,803	81,984	83,080	82,787
2012			45,128	120,600	143,106	154,202	161,902	166,066	170,374	172,137
2013				56,857	118,642	144,491	160,651	170,279	175,474	182,911
2014					68,948	146,900	182,625	195,903	202,401	213,450
2015						54,762	114,768	138,794	145,820	154,816
2016							64,928	138,782	162,836	174,625
2017								74,926	167,782	197,699
2018									74,550	208,755
2019										83,456
									Total	1,490,454
							All outstanding liabilities before 2010, net of reinsurance			9,262
							Liabilities for losses and loss adjustment expenses, net of reinsurance			$ 637,789

The following table presents the average annual percentage payout of incurred losses and allocated loss adjustment expenses by age, net of reinsurance, as of December 31, 2019:

	Average annual percentage payout of incurred losses and allocated loss adjustment expenses by age, net of reinsurance									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Casualty	2.2%	7.5%	9.7%	11.4%	10.8 %	8.0%	7.1%	6.0%	5.2 %	1.1%
Property catastrophe	10.7%	25.5%	28.8%	9.2%	(0.7)%	1.7%	1.2%	0.4%	0.4 %	0.7%
Property excluding property catastrophe	27.2%	38.8%	11.6%	5.3%	1.7 %	1.2%	2.2%	0.2%	0.3 %	0.1%
Marine and aviation	8.7%	25.0%	17.3%	9.1%	2.4 %	6.7%	7.3%	0.5%	(0.6)%	—%
Other specialty	26.4%	35.7%	12.9%	5.5%	3.9 %	2.8%	2.4%	1.7%	(0.1)%	0.1%

Mortgage Segment

The Company's mortgage segment includes (1) direct mortgage insurance in the U.S., (2) direct mortgage insurance in Europe, (3) global mortgage reinsurance and (4) participation in various GSE credit risk-sharing products, with the latter three categories along with second lien and student loan exposures excluded on the basis of insignificance for the purposes of presenting disclosures related to short duration contracts.

For direct mortgage insurance business, the Company establishes case reserves for loans that have been reported as delinquent by loan servicers as well as those that are delinquent but not reported (IBNR reserves). The Company's U.S. mortgage insurance operations also reserve for the expenses of adjusting claims related to these delinquencies. The trigger that creates a case reserve estimate is that an insured loan is reported to us as being two payments in arrears. The actuarial reviews and documentation created in the reserving process are completed in accordance with generally accepted actuarial standards. The selected assumptions reflect the actuary's judgment based on historical data and experience combined with information concerning current underwriting, economic, judicial, regulatory and other influences on ultimate claim settlements.

Because the reserving process requires the Company to forecast future conditions, it is inherently uncertain and requires significant judgment and estimation. The use of different estimates would result in the establishment of different reserve levels. Additionally, changes in estimates are likely to occur from period to period as economic conditions change and the ultimate liability may vary significantly from the estimates used. Major risk factors include (but are not limited to) changes in home prices and borrower equity, which can limit the borrower's ability to sell the property and satisfy the outstanding loan balance, and changes in unemployment, which can affect the borrower's income and ability to make mortgage payments.

The lead methodology used by the Company is a frequency-severity method based on the inventory of pending delinquencies. Each month the loan servicers report the delinquency status of each insured loan. Using the frequency-severity method allows the Company to take advantage of its knowledge of the number of delinquent loans and the coverage provided ("risk size") on those loans by directly relating the reserves to these amounts. The delinquencies are grouped into homogeneous cohorts for analysis, reflecting product type and age of delinquency. A claim rate is then developed for each cohort which represents the frequency with which the delinquencies become claims. The claim frequency rates are based on an analysis of the patterns of emerging cure counts and claim counts, the foreclosure status of the pending delinquencies, the product and geographical mix of the delinquencies and our view of future economic and claim conditions, which include trends in home prices and unemployment. Claim rates can vary materially by age of delinquency, depending on the mix of delinquencies and economic conditions.

Claim size severity estimates are determined by examining the risk sizes on the delinquent loans and estimating the portion of risk that will be paid, as well as any expenses. This is done based on a review of historical development patterns, an assessment of economic conditions and the level of equity the borrowers may have in their homes, as well as considering economic conditions and loss mitigation opportunities. Mortgage insurance is generally not subject to large claim sizes, as with some other lines of insurance. A claim size over $250,000 is rare, and this helps reduce the volatility of claim size estimates. The claim rate and claim size assumptions generate case reserves for the population of reported delinquencies. The reserve for unreported delinquencies (included in IBNR reserves) is estimated by looking at historical patterns of reporting. Claim rates and claim sizes can then be assigned to estimated unreported delinquencies using assumptions made in the establishment of case reserves.

Mortgage insurance Loss Reserves are short-tail, in the sense that the vast majority of delinquencies are resolved within two years of being reported. While reserves are initially analyzed by reserve cohort, as described above, they are also rolled up by underwriting year to ensure that reserve assumptions are consistent with the performance of the underwriting year. The accuracy of prior reserve assumptions is also checked in hindsight to determine if adjustments to the assumptions are needed.

Loss Reserves for the Company's mortgage reinsurance business and GSE credit-risk sharing transactions are comprised of case reserves and IBNR reserves. The Company's mortgage reinsurance operations receive reports of delinquent loans and claims notices from ceding companies and record case reserves based upon the amount of reserves recommended by the ceding company. In addition, specific claim and delinquency information reported by ceding companies is used in the process of estimating IBNR reserves.

The tables below include the acquired business of United Guaranty Corporation (“UGC”) (including United Guaranty Residential Insurance Company), across all periods presented. Due to the length of time for which claims incurred typically remain outstanding prior to payment and the Company’s formation of the mortgage segment in 2014, the Company determined that eight accident years was sufficient for its current disclosures. The following table presents information on the mortgage segment’s short-duration insurance contracts:

Direct mortgage insurance business in the U.S. ($000’s except claim count)

Incurred losses and allocated loss adjustment expenses, net of reinsurance									December 31, 2019	
	Year ended December 31,									
Accident year	2012 unaudited	2013 unaudited	2014 unaudited	2015 unaudited	2016 unaudited	2017 unaudited	2018 unaudited	2019	Total of IBNR liabilities plus expected development on reported claims	Cumulative number of paid claims
2012	520,835	480,592	475,317	469,238	467,296	459,467	458,065	456,286	46	15,052
2013		469,311	419,668	411,793	405,809	395,693	393,149	390,987	38	9,445
2014			316,095	297,151	279,434	266,027	265,992	261,091	68	6,250
2015				222,790	197,238	198,001	194,677	189,235	67	4,490
2016					183,556	170,532	148,715	140,608	111	3,334
2017						179,376	132,220	107,255	212	2,241
2018							132,318	96,357	616	1,006
2019								108,424	11,315	87
							Total	$ 1,750,243		

Cumulative paid losses and allocated loss adjustment expenses, net of reinsurance								
2012	(106,065)	186,605	327,605	395,695	426,024	441,577	448,151	452,348
2013		41,447	203,957	308,956	353,189	373,909	382,200	386,853
2014			20,099	129,159	201,925	233,879	247,038	254,175
2015				16,159	92,431	151,222	171,337	180,321
2016					11,462	72,201	113,357	127,286
2017						8,622	48,112	78,650
2018							3,966	31,478
2019								2,899
								1,514,010
All outstanding liabilities before 2012, net of reinsurance								19,005
Liabilities for losses and loss adjustment expenses, net of reinsurance								$ 255,238

The following table presents the average annual percentage payout of incurred losses and allocated loss adjustment expenses by age, net of reinsurance, as of December 31, 2019:

Average annual percentage payout of incurred losses and allocated loss adjustment expenses by age, net of reinsurance	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
U.S. Primary	3.3%	42.3%	29.1%	11.8%	5.4%	2.8%	1.3%	0.9%

Other Segment

Loss Reserves for the ‘other’ segment (*i.e.*, Watford) are comprised of case reserves, ACRs and IBNR reserves. For all business assumed by Watford, the Company acts as reinsurance underwriting manager, provides actuarial and risk management services and recommends a level of Loss Reserves to Watford. 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 common and preferred shares and counterparty credit risk (mitigated by collateral) arising from the reinsurance transactions. The estimation of Loss Reserves for Watford is subject to the same risk factors as the estimation of Loss Reserves for the Company’s insurance, reinsurance and mortgage segments as described earlier. Watford performs its own reserve reviews and sets its reserves independently. As noted previously, the Company determined that amounts in the ‘other’ segment are insignificant for the purposes of these footnote disclosures.

For the year ended December 31, 2019, the Company did not make any significant changes in its methodologies or assumptions as described above (a) to determine the presented amounts of IBNR reserves, (b) for expected development on case reserves.

The Company measures claim frequency information on an individual claim count basis. Claim counts are provided for the insurance and mortgage segments, where reliable information is available. For insurance business, any claim which is reported to the Company is included in the count, even if it is subsequently settled without liability to the Company. The Company does not include claim count information for losses from U.S. insurance pool business where individual loss information is unavailable and impracticable to obtain. For mortgage business, only delinquencies which subsequently become claims are included in the claim count. For reinsurance business, claim counts are not provided. A significant amount of the Company's reinsurance business is written on a proportional basis, for which individual loss information is typically unavailable and impracticable to obtain.

For the year ended December 31, 2019, the Company did not make any significant changes in its methodologies or assumptions as described above to calculate the cumulative claim frequency.

The following table represents a reconciliation of the disclosures of net incurred and paid loss development tables to the reserve for losses and loss adjustment expenses at December 31, 2019:

	December 31, 2019
Net outstanding liabilities	
Insurance	
Property, energy, marine and aviation	$ 340,714
Third party occurrence business	2,264,839
Third party claims-made business	1,225,121
Multi-line and other specialty	887,227
Reinsurance	
Casualty	1,707,696
Property catastrophe	113,053
Property excluding property catastrophe	458,581
Marine and aviation	131,895
Other specialty	637,789
Mortgage	
U.S. primary	255,238
Other short duration lines not included in disclosures (1)	1,514,373
Total for short duration lines	**9,536,526**
Unpaid losses and loss adjustment expenses recoverable	
Insurance	
Property, energy, marine and aviation	213,004
Third party occurrence business	1,105,669
Third party claims-made business	728,511
Multi-line and other specialty	189,613
Reinsurance	
Casualty	532,387
Property catastrophe	282,910
Property excluding property catastrophe	48,554
Marine and aviation	28,893
Other specialty	206,022
Mortgage	
U.S. primary	21,875
Other short duration lines not included in disclosures (2)	1,472,777
Intercompany eliminations	(696,931)
Total for short duration lines	**4,133,284**
Lines other than short duration	55,989
Discounting	(22,012)
Unallocated claims adjustment expenses	188,055
	222,032
Total gross reserves for losses and loss adjustment expenses	**$ 13,891,842**

(1) Includes net outstanding liabilities of $1.1 billion for the 'other' segment.
(2) Includes unpaid loss and loss adjustment expenses recoverable related to the acquisition of Barbican and $319.3 million related to the loss portfolio transfer reinsurance agreement.

7. Reinsurance

In the normal course of business, the Company's insurance subsidiaries cede a portion of their premium through pro rata and excess of loss reinsurance agreements on a treaty or facultative basis. The Company's reinsurance subsidiaries participate in "common account" retrocessional arrangements for certain pro rata treaties. Such arrangements reduce the effect of individual or aggregate losses to all companies participating on such treaties, including the reinsurers, such as the Company's reinsurance subsidiaries, and the ceding company. In addition, the Company's reinsurance subsidiaries may purchase retrocessional coverage as part of their risk management program. The Company's mortgage subsidiaries cede a portion of their premium through quota share arrangements and enter into various aggregate excess of loss mortgage reinsurance agreements with various special purpose reinsurance companies. Reinsurance recoverables are recorded as assets, predicated on the reinsurers' ability to meet their obligations under the reinsurance agreements. If the reinsurers are unable to satisfy their obligations under the agreements, the Company's insurance or reinsurance subsidiaries would be liable for such defaulted amounts.

The effects of reinsurance on the Company's written and earned premiums and losses and loss adjustment expenses with unaffiliated reinsurers were as follows:

	Year Ended December 31,		
	2019	2018	2017
Premiums Written			
Direct	$ 5,681,523	$ 4,838,902	$ 4,447,457
Assumed	2,457,437	2,122,102	1,920,968
Ceded	(2,099,893)	(1,614,257)	(1,407,052)
Net	$ 6,039,067	$ 5,346,747	$ 4,961,373
Premiums Earned			
Direct	$ 5,447,829	$ 4,799,842	$ 4,379,131
Assumed	2,337,950	1,988,038	1,856,573
Ceded	(1,999,281)	(1,555,905)	(1,391,172)
Net	$ 5,786,498	$ 5,231,975	$ 4,844,532
Losses and Loss Adjustment Expenses			
Direct	$ 2,953,072	$ 2,472,133	$ 2,568,327
Assumed	1,602,528	1,307,317	1,442,077
Ceded	(1,422,148)	(889,344)	(1,042,958)
Net	$ 3,133,452	$ 2,890,106	$ 2,967,446

Reinsurance Recoverables

The Company monitors the financial condition of its reinsurers and attempts to place coverages only with substantial, financially sound carriers. Although the Company has not experienced any material credit losses to date, an inability of its reinsurers or retrocessionaires to meet their obligations to it over the relevant exposure periods for any reason could have a material adverse effect on its financial condition and results of operations.

The following table summarizes the Company's reinsurance recoverables on paid and unpaid losses (not including ceded unearned premiums) at December 31, 2019 and 2018:

	December 31,	
	2019	2018
Reinsurance recoverable on unpaid and paid losses and loss adjustment expenses	$ 4,346,816	$ 2,919,372
% due from carriers with A.M. Best rating of "A-" or better	61.2%	63.0%
% due from unrated fully collateralized reinsurers (1)	13.5%	12.9%
% due from all other carriers with no A.M. Best rating (2)	25.3%	24.1%
Largest balance due from any one carrier as % of total shareholders' equity	1.7%	2.7%

(1) Such amount is fully collateralized through reinsurance trusts.
(2) Over 90% of such amount is collateralized through reinsurance trusts or letters of credit.

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"). For the respective coverage periods, the Company 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. The Company 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 December 31, 2019:

	Initial Coverage at Issuance	Coverage at Dec. 31, 2019	First Layer Retention
Bellemeade 2017-1 Ltd. (1)	368,114	216,429	165,652
Bellemeade 2018-1 Ltd. (2)	374,460	328,482	168,510
Bellemeade 2018-2 Ltd. (3)	653,278	437,009	352,258
Bellemeade 2018-3 Ltd. (4)	506,110	426,806	179,331
Bellemeade 2019-1 Ltd. (5)	341,790	257,358	208,046
Bellemeade 2019-2 Ltd. (6)	621,022	525,959	221,794
Bellemeade 2019-3 Ltd. (7)	700,920	656,523	232,093
Bellemeade 2019-4 Ltd. (8)	577,267	577,267	162,357
Total	$ 4,142,961	$ 3,425,833	$ 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 to 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.

See Note 11, "Variable Interest Entity and Noncontrolling Interests."

8. Investment Information

At December 31, 2019, total investable assets of $24.99 billion included $22.29 billion held by the Company and $2.70 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	Cost or Amortized Cost	OTTI Unrealized Losses (2)
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	(6)
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	(6)
Short-term investments	956,546	811	(1,548)	957,283	—
Total	$ 18,219,582	$ 351,114	$ (55,003)	$ 17,923,471	$ (6)
December 31, 2018					
Fixed maturities (1):					
Corporate bonds	$ 5,537,548	$ 14,476	$ (105,428)	$ 5,628,500	$ (69)
Mortgage backed securities	541,193	3,991	(3,216)	540,418	(6)
Municipal bonds	1,013,395	5,380	(11,891)	1,019,906	—
Commercial mortgage backed securities	729,442	2,650	(10,751)	737,543	—
U.S. government and government agencies	3,758,698	27,189	(8,474)	3,739,983	—
Non-U.S. government securities	1,771,338	14,477	(50,948)	1,807,809	—
Asset backed securities	1,600,896	8,060	(14,798)	1,607,634	—
Total	14,952,510	76,223	(205,506)	15,081,793	(75)
Short-term investments	955,880	36	(394)	956,238	—
Total	$ 15,908,390	$ 76,259	$ (205,900)	$ 16,038,031	$ (75)

(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) Represents the total OTTI recognized in accumulated other comprehensive income ("AOCI"). It does not include the change in fair value subsequent to the impairment measurement date. At December 31, 2019 and 2018, the net unrealized gain related to securities for which a non-credit OTTI was recognized in AOCI was nil.

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
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)
December 31, 2018						
Fixed maturities (1):						
Corporate bonds	$ 2,983,195	$ (68,910)	$ 1,234,865	$ (36,518)	$ 4,218,060	$ (105,428)
Mortgage backed securities	84,296	(695)	109,009	(2,521)	193,305	(3,216)
Municipal bonds	233,081	(2,074)	408,155	(9,817)	641,236	(11,891)
Commercial mortgage backed securities	223,341	(2,831)	193,956	(7,920)	417,297	(10,751)
U.S. government and government agencies	635,049	(1,354)	391,102	(7,120)	1,026,151	(8,474)
Non-U.S. government securities	1,028,340	(35,524)	389,671	(15,424)	1,418,011	(50,948)
Asset backed securities	533,592	(8,832)	368,095	(5,966)	901,687	(14,798)
Total	5,720,894	(120,220)	3,094,853	(85,286)	8,815,747	(205,506)
Short-term investments	122,878	(394)	—	—	122,878	(394)
Total	$ 5,843,772	$ (120,614)	$ 3,094,853	$ (85,286)	$ 8,938,625	$ (205,900)

(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 and reinvested and included the fixed maturities pledged. See "—Securities Lending Agreements."

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. The Company believes that such securities were temporarily impaired at December 31, 2019. At December 31, 2018, on a lot level basis, approximately 5,870 security lots out of a total of approximately 8,450 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 $2.6 million.

The contractual maturities of the Company's fixed maturities and fixed maturities pledged under securities lending agreements 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.

	December 31, 2019		December 31, 2018	
Maturity	Estimated Fair Value	Amortized Cost	Estimated Fair Value	Amortized Cost
Due in one year or less	$ 428,659	$ 423,617	$ 276,682	$ 279,135
Due after one year through five years	10,126,403	9,996,206	8,666,297	8,738,944
Due after five years through 10 years	3,317,535	3,219,567	2,919,232	2,951,582
Due after 10 years	411,269	388,280	218,768	226,537
	14,283,866	14,027,670	12,080,979	12,196,198
Mortgage backed securities	562,309	553,571	541,193	540,418
Commercial mortgage backed securities	733,108	720,487	729,442	737,543
Asset backed securities	1,683,753	1,664,460	1,600,896	1,607,634
Total (1)	$ 17,263,036	$ 16,966,188	$ 14,952,510	$ 15,081,793

(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 and reinvested and included the fixed maturities pledged. 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, 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 to the Company.

The Company receives collateral in the form of cash or securities. Cash collateral primarily consists of short-term investments. 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. At December 31, 2018, the fair value of the cash collateral received on securities lending was $19.0 million and the fair value of security collateral received was $255.1 million.

The Company's securities lending transactions were accounted for as secured borrowings with significant investment categories as follows:

	Remaining Contractual Maturity of the Agreements				
	Overnight and Continuous	Less than 30 Days	30-90 Days	90 Days or More	Total
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 10					—
Amounts related to securities lending not included in offsetting disclosure in Note 10					$ 388,366
December 31, 2018					
U.S. government and government agencies	$ 219,276	$ —	$ 32,583	$ —	$ 251,859
Corporate bonds	7,129	—	—	—	7,129
Equity securities	15,137	—	—	—	15,137
Total	$ 241,542	$ —	$ 32,583	$ —	$ 274,125
Gross amount of recognized liabilities for securities lending in offsetting disclosure in Note 10					—
Amounts related to securities lending not included in offsetting disclosure in Note 10					$ 274,125

Table of Contents

Equity Securities, at Fair Value

At December 31, 2019, the Company held $838.9 million of equity securities, at fair value, compared to $338.9 million at December 31, 2018. Pursuant to applicable accounting guidance, changes in fair value on equity securities are recorded through net income effective January 1, 2018.

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:

	December 31,	
	2019	2018
Term loan investments	1,326,018	1,282,287
Lending	602,841	524,112
Credit related funds	123,020	202,123
Energy	97,402	117,509
Investment grade fixed income	151,594	101,902
Infrastructure	61,786	45,371
Private equity	49,376	24,383
Real estate	17,279	14,252
Total	$ 2,429,316	$ 2,311,939

Investments Accounted For Using the Equity Method

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

	December 31,	
	2019	2018
Credit related funds	$ 428,437	$ 429,402
Equities	293,686	375,273
Real estate	246,851	232,647
Lending	202,690	125,041
Private equity	144,983	114,019
Infrastructure	235,033	113,748
Energy	108,716	103,661
Total	$ 1,660,396	$ 1,493,791

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 funds (which include changes in the fair 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.

A summary of financial information for the Company's investment funds accounted for using the equity method is as follows:

	December 31,	
	2019	2018
Invested assets	$ 26,383,370	$ 28,299,386
Total assets	28,039,181	29,833,681
Total liabilities	3,595,695	3,406,612
Net assets	$ 24,443,486	$ 26,427,069

	Year Ended December 31,		
	2019	2018	2017
Total revenues	$ 164,669	$ 4,565,354	$ 3,867,874
Total expenses	528,762	1,135,602	782,773
Net income (loss)	$ (364,093)	$ 3,429,752	$ 3,085,101

Certain of the Company's other investments and investments accounted for using the equity method 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 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:

	December 31,	
	2019	2018
Fixed maturities	$ 754,452	$ 1,245,562
Other investments	2,429,316	2,311,939
Short-term investments	377,014	322,177
Equity securities	102,695	103,893
Investments accounted for using the fair value option	$ 3,663,477	$ 3,983,571

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 determined that these limited partnership interests represented variable interests in the funds because the general partner did not have a significant interest in 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 item:

	December 31,	
	2019	2018
Investments accounted for using the equity method (1)	$ 1,660,396	$ 1,493,791
Investments accounted for using the fair value option (2)	188,283	162,398
Total	$ 1,848,679	$ 1,656,189

(1) Aggregate unfunded commitments were $1.36 billion at December 31, 2019, compared to $1.22 billion at December 31, 2018.
(2) Aggregate unfunded commitments were $41.7 million at December 31, 2019, compared to $117.5 million at December 31, 2018.

Net Investment Income

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

	Year Ended December 31,		
	2019	2018	2017
Fixed maturities	$ 505,399	$ 470,912	$ 385,919
Term loans	98,949	87,926	86,017
Equity securities	15,857	13,154	11,752
Short-term investments	15,820	18,793	10,964
Other (1)	80,618	64,942	68,249
Gross investment income	716,643	655,727	562,901
Investment expenses	(88,905)	(92,094)	(92,029)
Net investment income	$ 627,738	$ 563,633	$ 470,872

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

Net Realized Gains (Losses)

Net realized gains (losses) were as follows, excluding the other-than-temporary impairment provisions:

	Year Ended December 31,		
	2019	2018	2017
Available for sale securities:			
Gross gains on investment sales	$ 235,655	$ 69,299	$ 286,415
Gross losses on investment sales	(104,612)	(223,123)	(203,873)
Change in fair value of assets and liabilities accounted for using the fair value option:			
Fixed maturities	41,910	(90,898)	29,451
Other investments	(35,734)	(90,778)	51,124
Equity securities	15,869	(5,984)	18,707
Short-term investments	3,801	(461)	272
Equity securities, at fair value (1):			
Net realized gains (losses) on securities sold	11,313	(40,117)	—
Net unrealized gains (losses) on equity securities still held at reporting date	97,768	(22,828)	—
Derivative instruments (2)	119,741	15,636	(7,356)
Other (3)	(19,348)	(16,090)	(25,599)
Net realized gains (losses)	$ 366,363	$ (405,344)	$ 149,141

(1) Effective January 1, 2018, changes in fair value on equity securities are recorded through net income.
(2) See Note 10 for information on the Company's derivative instruments.
(3) Includes the re-measurement of contingent consideration liability amounts.

Equity in Net Income (Loss) of Investments Accounted For Using the Equity Method

The Company recorded equity in net income related to investments accounted for using the equity method of $123.7 million for 2019, compared to $45.6 million for 2018 and $142.3 million for 2017.

Other-Than-Temporary Impairments

The Company performs quarterly reviews of its available for sale investments in order to determine whether declines in fair value below the amortized cost basis were considered other-than-temporary in accordance with applicable guidance.

The following table details the net impairment losses recognized in earnings by asset class:

	Year Ended December 31,		
	2019	2018	2017
Fixed maturities:			
Mortgage backed securities	$ (915)	$ (437)	$ (1,488)
Corporate bonds	(1,256)	(1,232)	(2,884)
Non-U.S. government securities	—	(290)	(376)
Asset backed securities	(994)	(811)	—
U.S. government and government agencies	—	—	(426)
Municipal bonds	—	—	(375)
Total	(3,165)	(2,770)	(5,549)
Short-term investments	—	(59)	—
Equity securities	—	—	(1,422)
Other investments	—	—	(167)
Net impairment losses recognized in earnings	$ (3,165)	$ (2,829)	$ (7,138)

A description of the methodology and significant inputs used to measure the amount of net impairment losses recognized in earnings in 2019 is as follows:

- Corporate bonds – the Company reviewed the business prospects, credit ratings, estimated loss given default factors, foreign currency impacts and information received from asset managers and rating agencies for certain corporate bonds. Impairment losses were primarily from foreign currency impacts;
- Mortgage backed and asset backed securities – the Company utilized underlying data provided by asset managers, cash flow projections and additional information from credit agencies in order to determine an expected recovery value for each security.

The Company believes that the OTTI included in accumulated other comprehensive income at December 31, 2019 on the securities which were considered by the Company to be impaired was due to market and sector-related factors (*i.e.*, not credit losses). At December 31, 2019, the Company did not intend to sell these securities, or any other securities which were in an unrealized loss position, and determined that it is more likely than not that the Company will not be required to sell such securities before recovery of their cost basis.

The following table provides a roll forward of the amount related to credit losses recognized in earnings for which a portion of an OTTI was recognized in accumulated other comprehensive income:

	Year Ended December 31,		
	2019	2018	2017
Balance at start of year	$ 637	$ 767	$ 13,138
Credit loss impairments recognized on securities not previously impaired	—	—	31
Credit loss impairments recognized on securities previously impaired	—	—	210
Reductions for increases in cash flows expected to be collected that are recognized over the remaining life of the security	—	—	—
Reductions for securities sold during the period	(291)	(130)	(12,612)
Balance at end of year	$ 346	$ 637	$ 767

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

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

	December 31,	
	2019	2018
Assets used for collateral or guarantees:		
Affiliated transactions	$ 4,526,761	$ 4,623,483
Third party agreements	2,278,248	2,181,682
Deposits with U.S. regulatory authorities	797,371	689,114
Deposits with non-U.S. regulatory authorities	119,238	59,624
Total restricted assets	$ 7,721,618	$ 7,553,903

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 December 31, 2019 and December 31, 2018, Watford held $1.0 billion and $1.3 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:

	December 31,		
	2019	2018	2017
Cash	$ 726,230	$ 646,556	$ 606,199
Restricted cash (included in 'other assets')	177,468	78,087	121,085
Cash and restricted cash	$ 903,698	$ 724,643	$ 727,284

9. 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 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.

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 $22.9 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. Of the $20.4 billion of financial assets and liabilities measured at fair value at December 31, 2018, approximately $217.9 million, or 1.1%, 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. 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. During 2019, the Company transferred $25.8 million of corporate bonds from Level 2 to Level 3 based on a review of the pricing of such securities, as described above.

• 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.

• 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. 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. 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. Other equity securities are included in Level 2 of the valuation hierarchy. A small number of 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. During the 2019 second quarter, the Company transferred $107.4 million of equity securities from Level 2 to Level 3 based on a review of the pricing of such securities, as described above.

Other investments

The Company determined that exchange-traded investments 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. A small number of securities are included in Level 3 due to the lack of an available independent price source for such securities. During 2019, the Company transferred $31.6 million of other investments from Level 2 to Level 3 based on a review of the pricing of such securities, as described above.

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.

Contingent consideration liabilities

Contingent consideration liabilities (included in 'other liabilities' in the consolidated balance sheets) include amounts related to the Company's 2014 acquisition of CMG Mortgage Insurance Company and its affiliated mortgage insurance companies (the "CMG Entities") and other acquisitions. Such amounts are remeasured at fair value at each balance sheet date with changes in fair value recognized in 'net realized gains (losses).' To determine the fair value of contingent consideration liabilities, the Company estimates future payments using an income approach based on modeled inputs which include a weighted average cost of capital. The Company determined that contingent consideration liabilities would be included within Level 3.

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

		Fair Value Measurement Using:		
	Estimated Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets measured at fair value (1):				
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
Short-term investments	956,546	904,804	51,742	—
Equity securities, at fair value	850,283	789,596	4,798	55,889
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
Liabilities measured at fair value:				
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 8.

(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 10.

The following table presents the Company's financial assets and liabilities measured at fair value by level at December 31, 2018:

	Estimated Fair Value	Fair Value Measurement Using: Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets measured at fair value (1):				
Available for sale securities:				
Fixed maturities:				
Corporate bonds	$ 5,537,548	$ —	$ 5,529,407	$ 8,141
Mortgage backed securities	541,193	—	540,884	309
Municipal bonds	1,013,395	—	1,013,395	—
Commercial mortgage backed securities	729,442	—	729,438	4
U.S. government and government agencies	3,758,698	3,657,181	101,517	—
Non-U.S. government securities	1,771,338	—	1,771,338	—
Asset backed securities	1,600,896	—	1,600,896	—
Total	14,952,510	3,657,181	11,286,875	8,454
Equity securities	353,794	321,927	31,867	—
Short-term investments	955,880	875,881	79,999	—
Derivative instruments (4)	73,893	—	73,893	—
Fair value option:				
Corporate bonds	852,585	—	846,827	5,758
Non-U.S. government bonds	79,066	—	79,066	—
Mortgage backed securities	16,731	—	16,731	—
Municipal bonds	7,144	—	7,144	—
Commercial mortgage backed securities	—	—	—	—
Asset backed securities	178,790	—	178,790	—
U.S. government and government agencies	111,246	111,138	108	—
Short-term investments	322,177	278,579	43,598	—
Equity securities	103,893	48,827	55,066	—
Other investments	1,254,220	39,107	1,152,408	62,705
Other investments measured at net asset value (2)	1,057,719			
Total	3,983,571	477,651	2,379,738	68,463
Total assets measured at fair value	$ 20,319,648	$ 5,332,640	$ 13,852,372	$ 76,917
Liabilities measured at fair value:				
Contingent consideration liabilities	$ (66,665)	$ —	$ —	$ (66,665)
Securities sold but not yet purchased (3)	(7,790)	—	(7,790)	—
Derivative instruments (4)	(20,664)	—	(20,664)	—
Total liabilities measured at fair value	$ (95,119)	$ —	$ (28,454)	$ (66,665)

(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 8.

(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 10.

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 for 2019 and 2018:

	Assets						Liabilities
	Available For Sale		Fair Value Option			Fair Value	
	Structured Securities (1)	Corporate Bonds	Corporate Bonds	Other Investments	Equity Securities	Equity Securities	Contingent Consideration Liabilities
Year Ended December 31, 2019							
Balance at beginning of year	$ 313	$ 8,141	$ 5,758	$ 62,705	$ —	$ —	$ (66,665)
Total gains or (losses) (realized/unrealized)							
Included in earnings (2)	1,760	2	(162)	(8,119)	1,949	(3,418)	(1,478)
Included in other comprehensive income	3	(267)	—	—	—	—	—
Purchases, issuances, sales and settlements							
Purchases	—	881	—	3,746	—	36,077	—
Issuances	—	—	—	—	—	—	(548)
Sales	(1,757)	—	(28,583)	(20,495)	—	(27,982)	—
Settlements	(552)	(1,766)	—	(600)	—	—	60,693
Transfers in and/or out of Level 3	5,449	1,860	23,919	31,580	56,145	51,212	—
Balance at end of year	$ 5,216	$ 8,851	$ 932	$ 68,817	$ 58,094	$ 55,889	$ (7,998)
Year Ended December 31, 2018							
Balance at beginning of year	$ 5,927	$ 9,460	$ 12,217	$ 59,167	$ —	$ —	$ (60,996)
Total gains or (losses) (realized/unrealized)							
Included in earnings (2)	4	(1)	(334)	(1,416)	—	—	(5,669)
Included in other comprehensive income	(11)	(296)	—	—	—	—	—
Purchases, issuances, sales and settlements							
Purchases	—	802	—	6,250	—	—	—
Issuances	—	—	—	—	—	—	—
Sales	(5,003)	—	—	(296)	—	—	—
Settlements	(604)	(1,824)	(6,125)	(1,000)	—	—	—
Transfers in and/or out of Level 3	—	—	—	—	—	—	—
Balance at end of year	$ 313	$ 8,141	$ 5,758	$ 62,705	$ —	$ —	$ (66,665)

(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 December 31, 2019, due to their respective short maturities. As these financial instruments are not actively traded, their respective fair values are classified within Level 2.

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. At December 31, 2018, the Company's senior notes were carried at their cost, net of debt issuance costs, of $1.73 billion and had a fair value of $1.88 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 value of the senior notes is classified within Level 2.

Fair Value Measurements on a Non-Recurring Basis

The Company measures the fair value of certain assets on a non-recurring basis, generally quarterly, annually, or when events or changes in circumstances indicate that the carrying amount of the assets may not be recoverable. These assets include investments accounted for using the equity method, certain other investments, goodwill and intangible assets, and long-lived assets. The Company uses a variety of techniques to measure the fair value of these assets when appropriate, as described below:

Investments accounted for using the equity method. When the Company determines that the carrying value of these assets may not be recoverable, the Company records the assets at fair value with the loss recognized in income. In such cases, the Company measures the fair value of these assets using the techniques discussed above in "—Fair Value Measurements on a Recurring Basis."

Goodwill and Intangible Assets. The Company tests goodwill and intangible assets for impairment whenever events or changes in circumstances indicate the carrying amount may not be recoverable. When the Company determines goodwill and intangible assets may be impaired, the Company uses techniques including discounted expected future cash flows, to measure fair value.

Long-Lived Assets. The Company tests its long-lived assets for impairment whenever events or changes in circumstances indicate the carrying amount of a long-lived asset may not be recoverable.

10. 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		
	Asset Derivatives	Liability Derivatives	Notional Value (1)
December 31, 2019			
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	$ 103,956	$ (39,750)	
December 31, 2018			
Futures contracts (2)	$ 51,800	$ (2,115)	$ 3,153,518
Foreign currency forward contracts (2)	8,147	(7,796)	1,008,907
TBAs (3)	8,292	—	8,132
Other (2)	13,946	(10,753)	2,213,981
Total	$ 82,185	$ (20,664)	

(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.' Such amounts include risk in force on GSE credit-risk sharing transactions that are accounted for as derivatives.
(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 December 31, 2019 or 2018.

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. Effectively, contractual close-out netting reduces the derivatives credit exposure from a gross to a net exposure. At December 31, 2019, $97.8 million and $37.8 million, respectively, of asset derivatives and liability derivatives were subject to a master netting agreement compared to $80.4 million and $18.9 million, respectively, at December 31, 2018. The remaining derivatives included in the table above were not subject to a master netting agreement.

All 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	Year Ended December 31, 2019	2018	2017
Net realized gains (losses):			
Futures contracts	$ 114,123	$ 48,443	$ 9,318
Foreign currency forward contracts	(9,499)	(21,770)	(14,495)
TBAs	463	(133)	9
Other	14,654	(10,904)	(2,188)
Total	$ 119,741	$ 15,636	$ (7,356)

11. Variable Interest Entity and Noncontrolling Interests

Watford Holdings Ltd.

In March 2014, Watford raised approximately $1.1 billion of capital consisting of $907.3 million in common equity ($895.6 million net of issuance costs) and $226.6 million in preference equity ($219.2 million net of issuance costs and discount). The Company invested $100.0 million and acquired 2,500,000 common shares, and a warrant to purchase up to 975,503 additional common shares. The warrants expire on March 31, 2020, and are exercisable at any time. The exercise price of the warrants is determined on the date of exercise based on certain targeted returns for existing common shareholders. Watford's common shares are listed on the Nasdaq Select Global Market under the ticker symbol "WTRE". As of December 31, 2019, the Company owns approximately 13% of Watford's outstanding common equity.

Subsidiaries of the Company act as Watford's reinsurance and insurance underwriting managers. HPS Investment Partners, LLC ("HPS") manages Watford's non-investment grade credit portfolios, and the Company manages Watford's investment grade portfolios, each under separate long term services agreements. John Rathgeber, previously Vice Chairman of Arch Worldwide Reinsurance Group, is CEO of Watford. In addition, Maamoun Rajeh and Nicolas Papadopoulo, both officers of the Company, serve on the board of directors of Watford.

The Company concluded that Watford is a VIE and that the Company is the primary beneficiary. The Company includes the results of Watford in its consolidated financial statements. The Company concluded that Watford should be reflected in a separate operating segment ('other') and provides the income statement and total investable assets, total assets and total liabilities of Watford within Note 4.

Because 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. The Company's financial exposure to Watford is limited to its investment in Watford's senior notes, common shares and preferred shares and counterparty credit risk (mitigated by collateral) arising from the reinsurance transactions.

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

	December 31, 2019	2018
Assets		
Investments accounted for using the fair value option	$ 1,898,091	$ 2,312,003
Fixed maturities available for sale, at fair value	745,708	393,351
Equity securities, at fair value	65,338	32,206
Cash	102,437	63,529
Accrued investment income	14,025	19,461
Premiums receivable	273,657	227,301
Reinsurance recoverable on unpaid and paid losses and LAE	170,973	86,445
Ceded unearned premiums	132,577	61,587
Deferred acquisition costs, net	64,044	80,858
Receivable for securities sold	16,287	24,507
Goodwill and intangible assets	7,650	7,650
Other assets	60,070	63,959
Total assets of consolidated VIE	$ 3,550,857	$ 3,372,857
Liabilities		
Reserves for losses and loss adjustment expenses	$ 1,263,628	$ 1,032,760
Unearned premiums	438,907	390,114
Reinsurance balances payable	77,066	21,034
Revolving credit agreement borrowings	484,287	455,682
Senior notes	172,418	—
Payable for securities purchased	18,180	60,142
Other liabilities	171,714	302,524
Total liabilities of consolidated VIE	$ 2,626,200	$ 2,262,256
Redeemable noncontrolling interests	$ 52,305	$ 220,992

The following table summarizes Watford's cash flow from operating, investing and financing activities.

	Year Ended December 31, 2019	2018	2017
Total cash provided by (used for):			
Operating activities	239,284	229,315	286,558
Investing activities	(140,620)	(285,281)	(467,418)
Financing activities	(61,433)	(2,406)	162,152

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 senior notes, common shares was approximately 87% at December 31, 2019. 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:

	December 31,	
	2019	2018
Balance, beginning of year	$ 791,560	$ 843,411
Additional paid in capital attributable to non-redeemable noncontrolling interests	(2,929)	—
Repurchases attributable to non-redeemable noncontrolling interests (1)	(75,056)	—
Amounts attributable to non-redeemable noncontrolling interests	40,072	(48,507)
Other comprehensive (income) loss attributable to non-redeemable noncontrolling interests	9,130	(3,344)
Balance, end of year	$ 762,777	$ 791,560

(1) During 2019, 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. Holders of the Watford Preference Shares will be entitled to receive, if declared by Watford's board, quarterly cash dividends on the last day of March, June, September, and December. Dividends accrued from the closing date to June 30, 2019 at a fixed rate of 8.5% per annum. From June 30, 2019 and subsequent, dividends will accrue based on a floating rate equal to the 3 month U.S. dollar LIBOR (with a 1% floor) plus a margin based on the difference between the fixed rate and the 5 year mid swap rate to the floating rate. 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. Because the redemption features are not solely within the control of Watford, the Company accounts for the redeemable noncontrolling interests in the Watford Preference Shares in the mezzanine section of its consolidated balance sheets.

On August 1, 2019, Watford redeemed 6,919,998 of its 9,065,200 issued and outstanding preference shares ("Watford Preference Shares") at a total redemption price of $25.19748 per share, inclusive of all declared and unpaid dividends. The Company received $11.5 million pursuant to the redemption of Watford Preference Shares.

Preferred dividends on the Watford Preference Shares, including the accretion of the discount and issuance costs, was $17.8 million for 2019, compared to $19.6 million for 2018 and 2017.

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

	December 31,		
	2019	2018	2017
Balance, beginning of year	$ 206,292	$ 205,922	$ 205,553
Redemption of redeemable noncontrolling interests	(157,709)	—	—
Accretion of preference share issuance costs	244	370	369
Other	6,577	—	—
Balance, end of year	$ 55,404	$ 206,292	$ 205,922

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

	December 31,		
	2019	2018	2017
Amounts attributable to non-redeemable noncontrolling interests	$ (40,072)	$ 48,507	$ 7,913
Dividends attributable to redeemable noncontrolling interests	(16,909)	(18,357)	(18,344)
Net (income) loss attributable to noncontrolling interests	$ (56,981)	$ 30,150	$ (10,431)

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.

		Maximum Exposure to Loss		
	Total VIE Assets	On-Balance Sheet (Asset) Liabilities	Off-Balance Sheet	Total
December 31, 2019				
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	$ 3,425,833	$ (5,197)	$ 42,084	$ 36,887
December 31, 2018				
Bellemeade 2015-1 Ltd. (Jul-15)	$ 43,246	$ 112	$ 498	$ 610
Bellemeade 2017-1 Ltd. (Oct-17)	304,373	165	1,312	1,477
Bellemeade 2018-1 Ltd. (Apr-18)	374,460	132	3,539	3,671
Bellemeade 2018-2 Ltd. (Aug-18)	653,278	874	4,005	4,879
Bellemeade 2018-3 Ltd. (Oct-18)	506,110	469	1,836	2,305
Total	$ 1,881,467	$ 1,752	$ 11,190	$ 12,942

See Note 7, "Reinsurance."

12. Other Comprehensive Income (Loss)

The following table presents the changes in each component of AOCI, net of noncontrolling interests:

	Unrealized Appreciation on Available-For-Sale Investments	Foreign Currency Translation Adjustments	Total
Year Ended December 31, 2019			
Beginning balance	$ (114,178)	$ (64,542)	$ (178,720)
Other comprehensive income (loss) before reclassifications	491,605	18,147	509,752
Amounts reclassified from accumulated other comprehensive income	(118,941)	—	(118,941)
Net current period other comprehensive income (loss)	372,664	18,147	390,811
Ending balance	$ 258,486	$ (46,395)	$ 212,091
Year Ended December 31, 2018			
Beginning balance	$ 157,400	$ (39,356)	$ 118,044
Cumulative effect of an accounting change	(149,794)	—	(149,794)
Other comprehensive income (loss) before reclassifications	(266,357)	(25,186)	(291,543)
Amounts reclassified from accumulated other comprehensive income	144,573	—	144,573
Net current period other comprehensive income (loss)	(121,784)	(25,186)	(146,970)
Ending balance	$ (114,178)	$ (64,542)	$ (178,720)
Year Ended December 31, 2017			
Beginning balance	$ (27,641)	$ (86,900)	$ (114,541)
Other comprehensive income (loss) before reclassifications	252,904	47,544	300,448
Amounts reclassified from accumulated other comprehensive income	(67,863)	—	(67,863)
Net current period other comprehensive income (loss)	185,041	47,544	232,585
Ending balance	$ 157,400	$ (39,356)	$ 118,044

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 Year Ended December 31, 2019	2018	2017
Unrealized appreciation on available-for-sale investments				
	Net realized gains (losses)	$ 131,043	$ (153,822)	$ 82,542
	Other-than-temporary impairment losses	(3,165)	(2,829)	(7,138)
	Total before tax	127,878	(156,651)	75,404
	Income tax (expense) benefit	(8,937)	12,078	(7,541)
	Net of tax	$ 118,941	$ (144,573)	$ 67,863

Following are the related tax effects allocated to each component of other comprehensive income (loss):

	Before Tax Amount	Tax Expense (Benefit)	Net of Tax Amount
Year Ended December 31, 2019			
Unrealized appreciation (decline) in value of investments:			
Unrealized holding gains (losses) arising during period	$ 562,576	$ 61,805	$ 500,771
Less reclassification of net realized gains (losses) included in net income	127,878	8,937	118,941
Foreign currency translation adjustments	18,463	353	18,110
Other comprehensive income (loss)	$ 453,161	$ 53,221	$ 399,940
Year Ended December 31, 2018			
Unrealized appreciation (decline) in value of investments:			
Unrealized holding gains (losses) arising during period	$ (294,267)	$ (24,210)	$ (270,057)
Less reclassification of net realized gains (losses) included in net income	(156,651)	(12,078)	(144,573)
Foreign currency translation adjustments	(25,006)	(176)	(24,830)
Other comprehensive income (loss)	$ (162,622)	$ (12,308)	$ (150,314)
Year Ended December 31, 2017			
Unrealized appreciation (decline) in value of investments:			
Unrealized holding gains (losses) arising during period	$ 266,559	$ 13,655	$ 252,904
Less reclassification of net realized gains (losses) included in net income	75,404	7,541	67,863
Foreign currency translation adjustments	47,549	535	47,014
Other comprehensive income (loss)	$ 238,704	$ 6,649	$ 232,055

13. Earnings Per Common Share

The calculation of basic earnings per common share is computed by dividing income available to Arch common shareholders by the weighted average number of Common Shares and common share equivalents outstanding. The following table sets forth the computation of basic and diluted earnings per common share:

	Year Ended December 31,		
	2019	2018	2017
Numerator:			
Net income	$ 1,693,300	$ 727,821	$ 629,709
Amounts attributable to noncontrolling interests	(56,981)	30,150	(10,431)
Net income available to Arch	1,636,319	757,971	619,278
Preferred dividends	(41,612)	(41,645)	(46,041)
Loss on redemption of preferred shares	—	(2,710)	(6,735)
Net income available to Arch common shareholders	$ 1,594,707	$ 713,616	$ 566,502
Denominator:			
Weighted average common shares outstanding	401,802,815	401,036,376	377,531,628
Series D preferred securities (1)	—	3,311,245	26,606,736
Weighted average common shares outstanding – basic	401,802,815	404,347,621	404,138,364
Effect of dilutive common share equivalents:			
Nonvested restricted shares	1,673,770	1,474,207	3,936,594
Stock options (2)	8,132,893	7,084,650	9,710,067
Weighted average common shares and common share equivalents outstanding – diluted	411,609,478	412,906,478	417,785,025
Earnings per common share:			
Basic	$ 3.97	$ 1.76	$ 1.40
Diluted	$ 3.87	$ 1.73	$ 1.36

(1) The company has determined that, based on a review of the terms, features and rights of the Company's non-voting common equivalent preferred shares compared to the rights of the Company's common shareholders, the underlying common shares that the convertible securities convert to were common share equivalents at the time of their issuance.

(2) 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 2019, 2018 and 2017, the number of stock options excluded were 1,302,017, 5,673,821 and 2,603,451, respectively.

14. Income Taxes

Arch Capital is incorporated under the laws of Bermuda and, under current Bermuda law, is not obligated to pay any taxes in Bermuda based upon income or capital gains. The Company has received a written undertaking from the Minister of Finance in Bermuda under the Exempted Undertakings Tax Protection Act 1966 that, in the event that any legislation is enacted in Bermuda imposing any tax computed on profits, income, gain or appreciation on any capital asset, or any tax in the nature of estate duty or inheritance tax, such tax will not be applicable to Arch Capital or any of its operations until March 31, 2035. This undertaking does not, however, prevent the imposition of taxes on any person ordinarily resident in Bermuda or any company in respect of its ownership of real property or leasehold interests in Bermuda.

Arch Capital and its non-U.S. subsidiaries will be subject to U.S. federal income tax only to the extent that they derive U.S. source income that is subject to U.S. withholding tax or income that is effectively connected with the conduct of a trade or business within the U.S. and is not exempt from U.S. tax under an applicable income tax treaty with the U.S. Arch Capital and its non-U.S. subsidiaries will be subject to a withholding tax on dividends from U.S. investments and interest from certain U.S. payors (subject to reduction by any applicable income tax treaty). Arch Capital and its non-U.S. subsidiaries intend to conduct their operations in a manner that will not cause them to be treated as engaged in a trade or business in the United States and, therefore, will not be required to pay U.S. federal income taxes (other than U.S. excise taxes on insurance and reinsurance premium and withholding taxes on dividends and certain other U.S. source investment income). However, because there is uncertainty as to the activities which constitute being engaged in a trade or business within the United States, there can be no assurances that the U.S. Internal Revenue Service will not contend successfully that Arch Capital or its non-U.S. subsidiaries are engaged in a trade or business in the United States. If Arch Capital or any of its non-U.S. subsidiaries were subject to U.S. income tax, Arch Capital's shareholders' equity and earnings could be materially adversely affected. Arch Capital has subsidiaries and branches that operate in various jurisdictions around the world that are subject to tax in the jurisdictions in which they operate. The significant jurisdictions in which Arch Capital's subsidiaries and branches are subject to tax are the United States, United Kingdom, Ireland, Canada, Switzerland, Australia and Denmark.

The components of income taxes attributable to operations were as follows:

	Year Ended December 31,		
	2019	2018	2017
Current expense (benefit):			
United States	$ 139,407	$ 73,078	$ (51,705)
Non-U.S.	4,954	12,785	5,969
	144,361	85,863	(45,736)
Deferred expense (benefit):			
United States	11,849	19,544	169,093
Non-U.S.	(400)	8,544	4,211
	11,449	28,088	173,304
Income tax expense	$ 155,810	$ 113,951	$ 127,568

The Company's income or loss before income taxes was earned in the following jurisdictions:

	Year Ended December 31,		
	2019	2018	2017
Income (Loss) Before Income Taxes:			
Bermuda	$ 1,122,952	$ 388,492	$ 406,054
United States	701,480	440,823	381,157
Other	24,678	12,457	(29,934)
Total	$ 1,849,110	$ 841,772	$ 757,277

The expected tax provision computed on pre-tax income or loss at the weighted average tax rate has been calculated as the sum of the pre-tax income in each jurisdiction multiplied by that jurisdiction's applicable statutory tax rate. The 2019 applicable statutory tax rates by jurisdiction were as follows: Bermuda (0.0%), United States (21.0%), United Kingdom (19.0%), Ireland (12.5%), Denmark (22.0%), Canada (26.5%), Gibraltar (10.0%), Australia (30.0%), Hong Kong (16.5%) and the Netherlands (19.0%). The United States rate was 35% in 2017.

A reconciliation of the difference between the provision for income taxes and the expected tax provision at the weighted average tax rate follows:

	Year Ended December 31,		
	2019	2018	2017
Expected income tax expense (benefit) computed on pre-tax income at weighted average income tax rate	$ 149,799	$ 91,529	$ 126,262
Addition (reduction) in income tax expense (benefit) resulting from:			
Tax-exempt investment income	(3,091)	(4,790)	(13,330)
Meals and entertainment	1,134	1,060	1,063
State taxes, net of U.S. federal tax benefit	3,314	2,086	732
Foreign branch taxes	1,231	5,428	5,752
Prior year adjustment	632	(2,522)	(559)
Foreign exchange gains & losses	436	1,293	(572)
Changes in applicable tax rate	—	(128)	7,745
Dividend withholding taxes	6,510	6,594	232
Change in valuation allowance	1,628	18,396	14,798
Contingent consideration	190	740	3,785
Share based compensation	(6,592)	(5,356)	(18,733)
Other	619	(379)	393
Income tax expense (benefit)	$ 155,810	$ 113,951	$ 127,568

The effect of a change in tax laws or rates on deferred taxes assets and liabilities is recognized in income in the period in which such change is enacted.

On December 22, 2017, the Tax Cuts Act was signed into law which significantly changed the U.S. tax laws in many ways including a reduction of the U.S. federal income tax rate from 35% to 21% effective January 1, 2018. Also on December 22, 2017, the Securities and Exchange Commission issued Staff Accounting Bulletin No. 118 ("SAB 118") which provided guidance on accounting for tax effects of the Tax Cuts Act. SAB 118 provided a measurement period of up to one year from the enactment date to complete the accounting. During 2018, the Company finalized its accounting for the income tax impact of the Tax Cuts Act resulting in a tax expense of $1.2 million, primarily attributable to the write down of temporary differences identified following the filing of the Company's 2017 corporate tax return offset by AMT credits that were currently recoverable.

Deferred income tax assets and liabilities reflect temporary differences based on enacted tax rates between the carrying amounts of assets and liabilities for financial reporting and income tax purposes. Significant components of the Company's deferred income tax assets and liabilities were as follows:

	December 31, 2019	December 31, 2018
Deferred income tax assets:		
Net operating loss	$ 30,836	$ 24,089
Uncrystallized losses	1,565	7,960
AMT credit carryforward	1,323	2,652
Discounting of net loss reserves	52,582	43,130
Net unearned premium reserve	64,269	68,305
Compensation liabilities	21,693	20,492
Foreign tax credit carryforward	9,521	9,116
Interest expense	—	1,387
Goodwill and intangible assets	11,644	17,127
Bad debt reserves	5,983	5,626
Lease liability	26,438	—
Net unrealized foreign exchange losses	598	949
Net unrealized decline of investments	—	13,453
Other, net	206	3,418
Deferred tax assets before valuation allowance	226,658	217,704
Valuation allowance	(48,219)	(44,659)
Deferred tax assets net of valuation allowance	178,439	173,045
Deferred income tax liabilities:		
Depreciation and amortization	(1,215)	(2,559)
Deposit accounting liability	(2,169)	(2,292)
Contingency reserve	(132,831)	(112,852)
Deferred policy acquisition costs	(29,847)	(32,105)
Net unrealized appreciation of investments	(38,764)	—
Right-of-use asset	(23,416)	—
Other, net	(3,680)	(735)
Total deferred tax liabilities	(231,922)	(150,543)
Net deferred income tax assets (liabilities)	$ (53,483)	$ 22,502

The Company provides a valuation allowance to reduce certain deferred tax assets to an amount which management expects to more likely than not be realized. As of December 31, 2019, the Company's valuation allowance was $48.2 million, compared to $44.7 million at December 31, 2018. The valuation allowance in both periods was primarily attributable to valuation allowance on the Company's U.K. Canadian and Australian operations and certain other deferred tax assets relating to loss carryforwards that have a limited use.

At December 31, 2019, the Company's net operating loss carryforwards and tax credits were as follows:

	Year Ended December 31, 2019	Expiration
Operating Loss Carryforwards		
United Kingdom	$ 89,000	No expiration
Ireland	10,200	No expiration
Australia	22,000	No expiration
Hong Kong	17,600	No expiration
Denmark	400	No expiration
United States (1) (2)	23,100	2029 - 2038
Tax Credits		
U.K. foreign tax credits	9,521	No expiration
U.S. refundable AMT credits	1,323	No expiration

(1) Includes $0.6 million net operating loss carryforwards from Watford.

(2) On January 30, 2014, the Company's U.S. mortgage operations underwent an ownership change for U.S. federal income tax purposes as a result of the Company's acquisition of the CMG Entities. As a result of this ownership change, a limitation has been imposed upon the utilization of approximately $8.9 million of the Company's existing U.S. net operating loss carryforwards. Utilization is limited to approximately $0.6 million per year in accordance with Section 382 of the Internal Revenue Code of 1986 as amended ("the Code").

The Company's U.S. mortgage operations are eligible for a tax deduction, subject to certain limitations, under Section 832(e) of the Code for amounts required by state law or regulation to be set aside in statutory contingency reserves. The deduction is allowed only to the extent that the Company purchases non-interest bearing U.S. Mortgage Guaranty Tax and Loss Bonds ("T&L Bonds") issued by the U.S. Treasury Department in an amount equal to the tax benefit derived from deducting any portion of the statutory contingency reserves. T&L Bonds are reflected in 'other assets' on the Company's balance sheet and totaled approximately $207.0 million at December 31, 2019, compared to $183.0 million at December 31, 2018.

Deferred income tax liabilities have not been accrued with respect to the undistributed earnings of the Company's U.S., U.K. and Ireland subsidiaries as it is the Company's intention that all such earnings will be indefinitely reinvested. If the earnings were to be distributed, as dividends or otherwise, such amounts may be subject to withholding tax in the jurisdiction of the paying entity. The Company no longer intends to indefinitely reinvest earnings from the Company's Canada subsidiary, however, no income or withholding taxes have been accrued as the Canada subsidiary does not have positive cumulative earnings and profits and therefore a distribution from this particular subsidiary would not be subject to income taxes or withholding taxes. Potential tax implications of repatriation from the Company's unremitted earnings that are indefinitely reinvested are driven by facts at the time of distribution. Therefore it is not practicable to estimate the income tax liabilities that might be incurred if such earnings were remitted. Distributions from the U.K. or Ireland would not be subject to withholding tax and no deferred income tax liability would need to be accrued.

The Company recognizes interest and penalties relating to unrecognized tax benefits in the provision for income taxes. As of December 31, 2019, the Company's total unrecognized tax benefits, including interest and penalties, were $2.0 million. If recognized, the full amount of the unrecognized tax benefit would impact the consolidated effective tax rate. A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows:

	December 31,	
	2019	2018
Balance at beginning of year	$ 2,008	$ 2,008
Additions based on tax positions related to the current year	—	—
Additions for tax positions of prior years	—	—
Reductions for tax positions of prior years	—	—
Settlements	—	—
Balance at end of year	$ 2,008	$ 2,008

The Company or its subsidiaries or branches files income tax returns in the U.S. federal jurisdiction and various state, local and foreign jurisdictions.The following table details open tax years that are potentially subject to examination by local tax authorities, in the following major jurisdictions:

Jurisdiction	Tax Years
United States	2016-2019
United Kingdom	2018-2019
Ireland	2015-2019
Canada	2016-2019
Switzerland	2017-2019
Denmark	2015-2019

As of December 31, 2019, the Company's current income tax payable (included in "Other liabilities") was $13.5 million.

15. 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 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 $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 11, "Variable Interest Entity and Noncontrolling Interests," for information about Watford.

16. 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:

December 31, 2019	
Operating lease costs	$ 30,478
Cash payments included in the measurement of lease liabilities reported in operating cash flows	$ 27,521
Right-of-use assets obtained in exchange for new lease liabilities	$ 7,445
Right-of-use assets (1)	$ 131,661
Operating lease liability (1)	$ 150,519
Weighted average discount rate	3.9%
Weighted average remaining lease term	6.4 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 December 31, 2019:

Years Ending December 31,	
2020	$ 31,907
2021	30,842
2022	27,597
2023	23,027
2024	16,913
2025 and thereafter	40,167
Total undiscounted lease liability	170,453
Less: present value adjustment	(19,934)
Operating lease liability	$ 150,519

At December 31, 2018, the future minimum rental commitments, exclusive of escalation clauses and maintenance costs and net of rental income, for all of the Company's operating leases was as follows:

Years Ending December 31,	
2019	$ 31,088
2020	30,491
2021	29,351
2022	26,068
2023	21,408
2024 and thereafter	54,745
Total	$ 193,151

All of these leases are for the rental of office space, with expiration terms that range from 2020 to 2030. Rental expense was approximately $30.5 million, $27.6 million and $31.1 million for 2019, 2018 and 2017, respectively.

At December 31, 2019, the Company has entered into certain financing lease agreements. The future lease payments for the Company's financing leases are expected to be $4.8 million and $2.1 million for 2020 and 2021, respectively.

17. Commitments and Contingencies

Concentrations of Credit Risk

The creditworthiness of a counterparty is evaluated by the Company, taking into account credit ratings assigned by independent agencies. The credit approval process involves an assessment of factors, including, among others, the counterparty, country and industry credit exposure limits. Collateral may be required, at the discretion of the Company, on certain transactions based on the creditworthiness of the counterparty.

The areas where significant concentrations of credit risk may exist include unpaid losses and loss adjustment expenses recoverable, contractholder receivables, ceded unearned premiums, paid losses and loss adjustment expenses recoverable net of reinsurance balances payable, investments and cash and cash equivalent balances. A credit exposure exists with respect to reinsurance recoverables as they may become uncollectible. The Company manages its credit risk in its reinsurance relationships by transacting with reinsurers that it considers financially sound and, if necessary, the Company may hold collateral in the form of funds, trust accounts and/or irrevocable letters of credit. This collateral can be drawn on for amounts that remain unpaid beyond specified time periods on an individual reinsurer basis. In addition, certain insurance policies written by the Company's insurance operations feature large deductibles, primarily in its construction and national accounts lines 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 policyholder for the deductible amount. These amounts are included on a gross basis in the consolidated balance sheet in contractholder payables and contractholder receivables, respectively. 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. In the instances where the company receives collateral in the form of cash, the Company records a related liability in "Collateral held for insured obligations."

In addition, the Company underwrites a significant amount of its business through brokers and a credit risk exists should any of these brokers be unable to fulfill their contractual obligations with respect to the payments of insurance and reinsurance balances owed to the Company. The following table summarizes the percentage of the Company's gross premiums written generated from or placed by the largest brokers:

	Year Ended December 31,		
Broker	2019	2018	2017
Aon Corporation and its subsidiaries	12.2%	11.4%	11.3%
Marsh & McLennan Companies and its subsidiaries	9.6%	9.3%	10.7%

No other broker and no one insured or reinsured accounted for more than 10% of gross premiums written for 2019, 2018 and 2017.

The Company's available for sale investment portfolio is managed in accordance with guidelines that have been tailored to meet specific investment strategies, including standards of diversification, which limit the allowable holdings of any single issue. There were no investments in any entity in excess of 10% of the Company's shareholders' equity at December 31, 2019 other than investments issued or guaranteed by the United States government or its agencies.

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 $1.69 billion and $1.77 billion at December 31, 2019 and 2018, respectively.

Contingent Consideration Liability

Pursuant to the Company's 2014 acquisition of the CMG Entities, the Company made a contingent consideration payment of $61.5 million in April 2019 and $71.7 million in April 2017. The maximum remaining amount of contingent consideration payments is $6.7 million over the remaining earn-out period. To the extent that the adjusted book value of the CMG Entities drops below the cumulative amount paid by the Company, no additional payments would be due.

Purchase Obligations

The Company has also entered into certain agreements which commit the Company to purchase goods or services, primarily related to software and computerized systems. Such purchase obligations were approximately $55.6 million and $39.5 million at December 31, 2019 and 2018, respectively.

Employment and Other Arrangements

At December 31, 2019, the Company has entered into employment agreements with certain of its executive officers. Such employment arrangements provide for compensation in the form of base salary, annual bonus, share-based awards, participation in the Company's employee benefit programs and the reimbursements of expenses.

18. Debt and Financing Arrangements

The Company's senior notes payable at December 31, 2019 and 2018 were as follows:

	Interest (Fixed)	Principal Amount	Carrying Amount at December 31, 2019	Carrying Amount at December 31, 2018
2034 notes (1)	7.350%	300,000	297,254	297,150
2043 notes (2)	5.144%	500,000	494,831	494,723
2026 notes (3)	4.011%	500,000	496,806	496,417
2046 notes (4)	5.031%	450,000	445,317	445,238
Watford notes (5)	6.500%	140,000	137,418	—
		$ 1,890,000	$1,871,626	$1,733,528

(1) Senior notes of Arch Capital issued on May 4, 2004 and due May 1, 2034 ("2034 notes").

(2) Senior notes of Arch-U.S., a wholly-owned subsidiary of Arch Capital, issued on December 13, 2013 and due November 1, 2043 ("2043 notes"), fully and unconditionally guaranteed by Arch Capital.

(3) Senior notes of Arch Capital Finance LLC ("Arch Finance"), a wholly-owned finance subsidiary of Arch Capital, issued on December 8, 2016 and due December 15, 2026 ("2026 notes"), fully and unconditionally guaranteed by Arch Capital.

(4) Senior notes of Arch Finance issued on December 8, 2016 and due December 15, 2046 ("2046 notes"), fully and unconditionally guaranteed by Arch Capital

(5) Senior notes of Watford issued on July 2, 2019 and due July 2, 2029, reflecting the elimination of amounts owned by Arch-U.S.

The 2034 notes are Arch Capital's senior unsecured obligations and rank equally with all of its existing and future senior unsecured indebtedness. Interest payments on the 2034 notes are due on May 1st and November 1st of each year. Arch Capital may redeem the 2034 notes at any time and from time to time, in whole or in part, at a "make-whole" redemption price.

The 2043 notes 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. Interest payments on the 2043 notes are due on May 1st and November 1st of each year. Arch-U.S. may redeem the 2043 notes at any time and from time to time, in whole or in part, at a "make-whole" redemption price.

The 2026 notes 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. Interest payments on the 2026 notes are due on June 15th and December 15th of each year. Arch Finance may redeem the 2026 notes at any time and from time to time, in whole or in part, at a "make-whole" redemption price.

The 2046 notes 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. Interest payments on the 2046 notes are due on June 15th and December 15th of each year. Arch Finance may redeem the 2046 notes at any time and from time to time, in whole or in part, at a "make-whole" redemption price.

On July 2, 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 will be paid semi-annually in arrears on each January 2 and July 2, commencing January 2, 2020. The $172.4 million net proceeds from the offering were used to redeem a portion of Watford Preference Shares. The Company purchased $35.0 million in aggregate principal amount of the Watford Senior Notes.

Letter of Credit and Revolving Credit Facilities

In the normal course of its operations, the Company enters into agreements with financial institutions to obtain secured and unsecured credit facilities.

On December 17, 2019, Arch Capital and certain of its subsidiaries entered into a $750.0 million five-year credit facility (the "Credit Facility") with a syndication of lenders. The Credit Facility consists of a $250.0 million secured facility for letters of credit (the "Secured Facility") and a $500.0 million unsecured facility for revolving loans and letters of credit (the "Unsecured Facility"). Obligations of each borrower under the Secured Facility for letters of credit are secured by cash and eligible securities of such borrower held in collateral accounts. Commitments under the Credit Facility may be increased up to, but not exceeding, an aggregate of $1.25 billion. Arch Capital has a one-time option to convert any or all outstanding revolving loans of Arch Capital and/or Arch-U.S. to term loans with the same terms as the revolving loans except that any prepayments may not be re-borrowed. Arch-U.S. guarantees the obligations of Arch Capital, and Arch Capital guarantees the obligations of Arch-U.S. Borrowings of revolving loans may be made at a variable rate based on LIBOR or an alternative base rate at the option of Arch Capital. Arch Capital and its lenders may agree on a LIBOR successor rate at the appropriate time to address the replacement of LIBOR. Secured letters of credit are available for issuance on behalf of certain Arch Capital subsidiaries. The Credit Facility is structured such that each party that requests a letter of credit or borrowing does so only for itself and its own obligations.

The Credit Facility contains certain restrictive covenants customary for facilities of this type, including restrictions on indebtedness, consolidated tangible net worth, minimum shareholders' equity levels and minimum financial strength ratings. Arch Capital and its subsidiaries which are party to the agreement were in compliance with all covenants contained therein at December 31, 2019.

Commitments under the Credit Facility will expire on December 17, 2024, and all loans then outstanding must be repaid. Letters of credit issued under the Unsecured Facility will not have an expiration date later than December 17, 2025.

Under the $250.0 million secured letter of credit facility, Arch Capital's subsidiaries had $225.4 million of letters of credit outstanding and remaining capacity of $24.6 million at December 31, 2019. In addition, certain of Arch Capital's subsidiaries had outstanding secured and unsecured letters of credit of $18.1 million and $195.0 million respectively, which were issued in the normal course of business.

When issued, all secured letters of credit are secured by a portion of the investment portfolio. At December 31, 2019, these letters of credit were secured by investments with a fair value of $255.4 million.

Watford has access to a $100 million secured letter of credit facility expiring on May 16, 2020, a $100 million unsecured letter of credit facility which auto extends on September 20, 2020 and an $800 million secured credit facility expiring on November 30, 2021 that provides for borrowings and the issuance of letters of credit not to exceed $400 million. Borrowings of revolving loans may be made by Watford at a variable rate based on LIBOR or an alternative base rate at the option of Watford. At December 31, 2019, Watford had $122.9 million in outstanding letters of credit under the two facilities and $484.3 million of borrowings outstanding under the secured credit facility, backed by Watford's investment portfolio. Watford was in compliance with all covenants contained in these credit facilities at December 31, 2019. 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 the reinsurance transactions.

The Company's outstanding revolving credit agreement borrowings were as follows:

	Year Ended December 31,	
	2019	2018
Arch Capital	$ —	$ —
Watford	484,287	455,682
Total	$ 484,287	$ 455,682

19. Goodwill and Intangible Assets

The following table shows an analysis of goodwill and intangible assets:

	Goodwill	Intangible assets (indefinite life)	Intangible assets (finite life)	Total
Net balance at Dec. 31, 2017	$ 198,236	$ 68,174	$ 386,201	$ 652,611
Acquisitions	51,476	—	43,000	94,476
Amortization	—	—	(105,670)	(105,670)
Impairment (1)	—	(6,300)	—	(6,300)
Foreign currency movements and other adjustments	(92)	—	(105)	(197)
Net balance at Dec. 31, 2018	249,620	61,874	323,426	634,920
Acquisitions (2)	74,780	24,431	82,482	181,693
Amortization	—	—	(82,104)	(82,104)
Impairment (1)	—	(1,000)	—	(1,000)
Foreign currency movements and other adjustments	2,151	605	1,817	4,574
Net balance at Dec. 31, 2019	$ 326,551	$ 85,910	$ 325,621	$ 738,083
Gross balance at Dec. 31, 2019	$ 331,448	$ 85,305	$ 744,583	$1,161,336
Accumulated amortization	—	—	(419,294)	(419,294)
Foreign currency movements and other adjustments	(4,897)	605	332	(3,959)
Net balance at Dec. 31, 2019	$ 326,551	$ 85,910	$ 325,621	$ 738,083

(1) The impairment to the indefinite-lived intangible assets during the year ended December 31, 2019 and 2018 of $1.0 million and $6.3 million related to insurance licenses from the acquisition of UGC.

(2) Certain amounts for the Company's 2019 acquisitions are considered provisional.

The following table presents the components of goodwill and intangible assets:

	Gross Balance	Accumulated Amortization	Foreign Currency Translation Adjustment and Other	Net Balance
Dec. 31, 2019				
Acquired insurance contracts	$ 452,470	$ (336,559)	$ 310	$ 116,221
Operating platform	52,674	(39,571)	(259)	12,844
Distribution relationships	243,838	(50,542)	212	193,508
Goodwill	331,448	—	(4,897)	326,551
Insurance licenses	63,390	—	—	63,390
Syndicate capacity	21,915	—	605	22,520
Unfavorable service contract	(9,533)	8,657	—	(876)
Other	5,134	(1,279)	70	3,925
Total	$1,161,336	$ (419,294)	$ (3,959)	$ 738,083
Dec. 31, 2018				
Acquired insurance contracts	$ 435,067	$ (271,981)	$ (150)	$ 162,936
Operating platform	47,400	(35,402)	—	11,998
Distribution relationships	186,611	(36,718)	(1,335)	148,558
Goodwill	256,668	—	(7,048)	249,620
Insurance licenses	61,874	—	—	61,874
Syndicate capacity	—	—	—	—
Unfavorable service contract	(9,533)	7,949	—	(1,584)
Other	2,556	(1,038)	—	1,518
Total	$ 980,643	$ (337,190)	$ (8,533)	$ 634,920

The estimated remaining amortization expense for the Company's intangible assets with finite lives is as follows:

2020	$ 65,958
2021	48,063
2022	33,972
2023	31,731
2024	27,566
2025 and thereafter	118,331
Total	$ 325,621

The estimated remaining useful lives of these assets range from one to seventeen years at December 31, 2019.

Other than the impairments described above, the Company's annual impairment reviews for goodwill and intangible assets did not result in the recognition of impairment losses for 2019, 2018 and 2017.

20. Shareholders' Equity

Authorized and Issued

The authorized share capital of Arch Capital consists of 1.8 billion Common Shares, par value of $0.0011 per share, and 50 million Preferred Shares, par value of $0.01 per share.

Common Shares

The following table presents a roll-forward of changes in Arch Capital's issued and outstanding Common Shares:

	Year Ended December 31,		
	2019	2018	2017
Common Shares:			
Shares issued and outstanding, beginning of year	570,737,283	549,872,226	523,932,303
Shares issued (1)	2,835,994	2,757,506	3,388,344
Conversion of Series D preferred shares (2)	—	17,022,600	21,265,860
Restricted shares issued, net of cancellations	1,043,918	1,084,951	1,285,719
Shares issued and outstanding, end of year	574,617,195	570,737,283	549,872,226
Common shares in treasury, end of year	(168,997,994)	(168,282,449)	(156,938,409)
Shares issued and outstanding, end of year	405,619,201	402,454,834	392,933,817

(1) Includes shares issued from the exercise of stock options and stock appreciation rights, and shares issued from the employee share purchase plan.
(2) Such shares represent common shares that were issued upon conversion of the non-voting common equivalent preference shares issued in connection with the AIG acquisition.

Three-For-One Common Share Split

In May 2018, shareholders approved a proposal to amend the memorandum of association by sub-dividing the authorized common shares of Arch Capital to effect a three-for-one split of Arch Capital's common shares. The share split changed the Company's authorized common shares to 1.8 billion common shares (600 million previously), with a par value of $.0011 per share ($.0033 previously). Information pertaining to the composition of the Company's shareholders' equity accounts, shares and earnings per share has been retroactively restated in the accompanying financial statements and notes to the consolidated financial statements to reflect the share split.

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. At December 31, 2019, $1.0 billion of share repurchases were available under the program. Repurchases under the program 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.

Repurchases of Arch Capital's common shares in connection with the share repurchase plan and other share-based transactions were held in the treasury under the cost method, and the cost of the common shares acquired is included in 'Common shares held in treasury, at cost.' At December 31, 2019, Arch Capital held 169.0 million shares for an aggregate cost of $2.41 billion in treasury, at cost.

The Company's repurchases under the share repurchase program were as follows:

	Year Ended December 31,		
	2019	2018	2017
Aggregate cost of shares repurchased	$ 2,871	$ 282,762	$ —
Shares repurchased	110,598	10,559,850	—
Average price per share repurchased	$ 25.96	$ 26.78	$ —

Since the inception of the share repurchase program through December 31, 2019, Arch Capital has repurchased approximately 386.3 million common shares for an aggregate purchase price of $3.97 billion.

Convertible Non-Voting Common Equivalent Preferred Shares

On December 31, 2016, the Company completed the acquisition of all of the outstanding shares of capital stock of UGC. Based upon a formula set forth in the Stock Purchase Agreement, AIG received 1,276,282 of Arch Capital's Series D convertible non-voting common equivalent preferred shares ("Series D Preferred Shares"). Each Series D Preferred Share converts to 10 shares of Arch Capital fully paid non-assessable common stock.

The Company determined, based on a review of the terms features and rights of the series D preferred shares compared to the rights of the Company's common shareholders, the underlying 38,288,460 common shares that the convertible securities convert to were common share equivalents at the time of their issuance.

In June 2017, Arch Capital completed an underwritten public secondary offering of 21,265,860 common shares by AIG following transfer of 708,862 Series D Preferred Shares. In March 2018, Arch Capital completed an underwritten public secondary offering of 17,022,600 common shares by AIG following transfer of 567,420 Series D Preferred Shares. Proceeds from the sale of common shares pursuant to the public offering were received by AIG. At December 31, 2019 and 2018, no Series D Preferred Shares were outstanding.

Series F Preferred Shares

In August 2017 and November 2017, Arch Capital completed combined $330 million of underwritten public offerings ($230 million in August 2017 and $100 million in November 2017) of 13.2 million depositary shares (the "Series F Depositary Shares"), each of which represents a 1/1,000th interest in a share of its 5.45% Non-Cumulative Preferred Shares, Series F, with a $0.01 par value and $25,000 liquidation preference per share (equivalent to $25 liquidation preference per Series F Depositary Share) (the "Series F Preferred Shares"). Each Series F Depositary Share, evidenced by a depositary receipt, entitles the holder, through the depositary, to a proportional fractional interest in all rights and preferences of the Series F Preferred Shares represented thereby (including any dividend, liquidation, redemption and voting rights).

Holders of Series F Preferred Shares will be entitled to receive dividend payments only when, as and if declared by our board of directors or a duly authorized committee of the board. Any such dividends will be payable from, and including, the date of original issue on a noncumulative basis, quarterly in arrears on the last day of March, June, September and December of each year, at an annual rate of 5.45%. Dividends on the Series F Preferred Shares are not cumulative. The Company will be restricted from paying dividends on or repurchasing its common shares unless certain dividend payments are made on the Series F Preferred Shares.

Except in specified circumstances relating to certain tax or corporate events, the Series F Preferred Shares are not redeemable prior to August 17, 2022 (the fifth anniversary of the issue date). On and after that date, the Series F Preferred Shares will be redeemable at the Company's option, in whole or in part, at a redemption price of $25,000 per share of the Series F Preferred Shares (equivalent to $25 per depositary share), plus any declared and unpaid dividends, without accumulation of any undeclared dividends to, but excluding, the redemption date. The Series F Depositary Shares will be redeemed if and to the extent the related Series F Preferred Shares are redeemed by the Company. Neither the Series F Depositary Shares nor the Series F Preferred Shares have a stated maturity, nor will they be subject to any sinking fund or mandatory redemption. The Series F Preferred Shares are not convertible into any other securities. The Series F Preferred Shares will not have voting rights, except under limited circumstances. The net proceeds from the Series F Preferred Share offerings were used to redeem the Company's outstanding 6.75% Series C Non-Cumulative Preferred Shares.

Series E Preferred Shares

On September 29, 2016, Arch Capital completed a $450 million underwritten public offering of 18.0 million depositary shares (the "Series E Depositary Shares"), each of which represents a 1/1,000th interest in a share of its 5.25% Non-Cumulative Preferred Shares, Series E, with a $0.01 par value and $25,000 liquidation preference per share (equivalent to $25 liquidation preference per Series E Depositary Share) (the "Series E Preferred Shares"). Each Series E Depositary Share, evidenced by a depositary receipt, entitles the holder, through the depositary, to a proportional fractional interest in all rights and preferences of the Series E Preferred Shares represented thereby (including any dividend, liquidation, redemption and voting rights).

Holders of Series E Preferred Shares will be entitled to receive dividend payments only when, as and if declared by our board of directors or a duly authorized committee of the board. Any such dividends will be payable from, and including, the date of original issue on a non-cumulative basis, quarterly in arrears on the last day of March, June, September and December of each year, at an annual rate of 5.25%. Dividends on the Series E Preferred Shares are not cumulative. The Company will be restricted from paying dividends on or repurchasing its common shares unless certain dividend payments are made on the Series E preferred shares.

Except in specified circumstances relating to certain tax or corporate events, the Series E Preferred Shares are not redeemable prior to September 29, 2021 (the fifth anniversary of the issue date). On and after that date, the Series E Preferred Shares will be redeemable at the Company's option, in whole or in part, at a redemption price of $25,000 per share of the Series E Preferred Shares (equivalent to $25 per Series E Depositary Share), plus any declared and unpaid dividends, without accumulation of any undeclared dividends to, but excluding, the redemption date. The Series E Depositary Shares will be redeemed if and to the extent the related Series E Preferred Shares are redeemed by the Company. Neither the Series E Depositary Shares nor the Series E Preferred Shares have a stated maturity, nor will they be subject to any sinking fund or mandatory redemption. The Series E Preferred Shares are not convertible into any other securities. The Series E Preferred Shares will not have voting rights, except under limited circumstances.

Series C Preferred Shares

On January 2, 2018, Arch Capital redeemed all outstanding 6.75% Series C non-cumulative preferred shares. The preferred shares were redeemed at a redemption price equal to $25 per share, plus all declared and unpaid dividends to (but excluding) the redemption date. In accordance with GAAP, following the redemption, original issuance costs related to such shares have been removed from additional paid-in capital and recorded as a "loss on redemption of preferred shares." Such adjustment had no impact on total shareholders' equity or cash flows.

21. Share-Based Compensation

Long Term Incentive and Share Award Plans

The Company utilizes share-based compensation plans for officers, other employees and directors of Arch Capital and its subsidiaries to provide competitive compensation opportunities, to encourage long-term service, to recognize individual contributions and reward achievement of performance goals and to promote the creation of long-term value for shareholders by aligning the interests of such persons with those of shareholders.

The 2018 Long-Term Incentive and Share Award Plan (the "2018 Plan") became effective as of May 9, 2018 following approval by shareholders of the Company. The 2018 Plan provides for the issuance of restricted stock units, performance units, restricted shares, performance shares, stock options and stock appreciation rights and other equity-based awards to our employees and directors. The 2018 Plan authorizes the issuance of 34,500,000 common shares and will terminate as to future awards on February 28, 2028. At December 31, 2019, 25,201,143 shares are available for future issuance.

The 2015 Long Term Incentive and Share Award Plan (the ("2015 Plan") authorizes the issuance of 12,900,000 common shares and became effective as of May 7, 2015 following approval by shareholders of the Company. The 2015 Plan provides for the issuance of share-based awards to our employees and directors and will terminate as to future awards on February 26, 2025. At December 31, 2019, 390,156 shares are available for future issuance.

The 2012 Long Term Incentive and Share Award Plan (the "2012 Plan") became effective as of May 9, 2012 following approval by shareholders of the Company. The 2012 Plan authorizes the issuance of 22,301,772 common shares and will terminate as to future awards on February 28, 2022. At December 31, 2019, 606,589 shares are available for grant under the 2012 Plan.

Upon shareholder approval on May 6, 2016, the Amended and Restated Arch Capital Group Ltd. 2007 Employee Share Purchase Plan (the "ESPP") became effective and a total of 4,689,777 common shares were reserved for issuance. The purpose of the ESPP is to give employees of Arch Capital and its subsidiaries an opportunity to purchase common shares through payroll deductions, thereby encouraging employees to share in the economic growth and success of Arch Capital and its subsidiaries. The ESPP is designed to qualify as an "employee share purchase plan" under Section 423 of the Code. At December 31, 2019, approximately 2,729,721 shares remain available for issuance.

Stock Options and Stock Appreciation Rights

The Company generally issues stock options and SARs to eligible employees, with exercise prices equal to the fair market values of the Company's Common Shares on the grant dates. Such grants generally vest over a three year period with one-third vesting on the first, second and third anniversaries of the grant date.

The grant date fair value is determined using the Black-Scholes option valuation model. The expected life assumption is based on an expected term analysis, which incorporates the Company's historical exercise experience. Expected volatility is based on the Company's daily historical trading data of its common shares. The table below summarizes the assumptions used.

	Year Ended December 31,		
	2019	2018	2017
Dividend yield	—%	—%	—%
Expected volatility	18.1%	21.3%	21.3%
Risk free interest rate	2.5%	2.8%	2.0%
Expected option life	6.0 years	6.0 years	6.0 years

A summary of stock option and SAR activity under the Company's Long Term Incentive and Share Award Plans during 2019 is presented below:

	Year Ended December 31, 2019			
	Number of Options / SARs	Weighted Average Exercise Price	Weighted Average Contractual Term	Aggregate Intrinsic Value
Outstanding, beginning of year	20,076,593	$ 19.37		
Granted	1,228,280	$ 32.86		
Exercised	(2,355,216)	$ 13.45		
Forfeited or expired	(96,639)	$ 29.19		
Outstanding, end of year	18,853,018	$ 20.94	5.03	$ 413,842
Exercisable, end of year	15,517,508	$ 19.05	4.28	$ 369,917

The aggregate intrinsic value of stock options and SARs exercised represents the difference between the exercise price of the stock options and SARs and the closing market price of the Company's common shares on the exercise dates. During 2019, the Company received proceeds of $13.1 million from the exercise of stock options and recognized a tax benefit of $6.9 million from the exercise of stock options and SARs.

	Year Ended December 31,		
	2019	2018	2017
Weighted average grant date fair value	$ 7.90	$ 7.50	$ 8.15
Aggregate intrinsic value of Options/SARs exercised	$ 51,350	$ 43,468	$ 64,173

Restricted Common Shares and Restricted Units

The Company also issues restricted share and unit awards to eligible employees and directors, for which the fair value is equal to the fair market values of the Company's Common Shares on the grant dates. Restricted share and unit awards generally vest over a three year period with one-third vesting on the first, second and third anniversaries of the grant date.

A summary of restricted share and restricted unit activity under the Company's Long Term Incentive and Share Award Plans for 2019 is presented below:

	Restricted Common Shares	Restricted Unit Awards
Unvested Shares:		
Unvested balance, beginning of year	1,619,285	1,254,558
Granted	384,926	810,815
Vested	(931,696)	(422,021)
Forfeited	(26,594)	(80,340)
Unvested balance, end of year	1,045,921	1,563,012
Weighted Average Grant Date Fair Value:		
Unvested balance, beginning of year	$ 28.88	$ 27.58
Granted	$ 33.43	$ 32.64
Vested	$ 28.31	$ 27.75
Forfeited	$ 30.15	$ 29.36
Unvested balance, end of year	$ 31.02	$ 30.07

The following table presents the weighted average grant date fair value of restricted shares and restricted unit awards granted and the aggregate fair value of restricted shares and unit awards vesting in each year.

	Year Ended December 31,		
	2019	2018	2017
Restricted shares and restricted unit awards granted	1,195,741	1,563,287	1,747,176
Weighted average grant date fair value	$ 32.89	$ 26.86	$ 32.02
Aggregate fair value of vested restricted share and unit awards	$ 46,262	$ 39,898	$ 133,848

The aggregate intrinsic value of restricted units outstanding at December 31, 2019 was $67.0 million.

Performance Awards

The Company also issues performance share and unit awards ("performance awards") to eligible employees, which are earned based on the achievement of pre-established threshold, target and maximum goals over three-year performance periods. Final payouts depend on the level of achievement along with each employees continued service through the vest date. The grant date fair value of the performance awards is measured using a Monte Carlo simulation model, which incorporated the assumptions summarized in the table below. Expected volatility is based on the Company's daily historical trading data of its common shares. The cumulative compensation expense recognized and unrecognized as of any reporting period date represents the adjusted estimate of performance shares and units that will ultimately be awarded, valued at their original grant date fair values.

	Year Ended December 31,		
	2019	2018	2017
Expected volatility	17.1%	16.2%	—%
Risk free interest rate	2.5%	2.6%	—%

	Performance Shares	Performance Units
Unvested Shares:		
Unvested balance, beginning of year	715,328	12,993
Granted	685,586	10,774
Vested	—	—
Forfeited	—	—
Unvested balance, end of year	1,400,914	23,767
Weighted Average Grant Date Fair Value:		
Unvested balance, beginning of year	$ 24.77	$ 24.71
Granted	$ 36.05	$ 35.83
Vested	$ —	$ —
Forfeited	$ —	$ —
Unvested balance, end of year	$ 30.29	$ 29.75

The following table presents the weighted average grant date fair values of performance awards granted.

	Year Ended December 31,		
	2019	2018	2017
Performance awards	696,360	743,513	—
Weighted average grant date fair value	$ 36.05	$ 24.77	$ —

The issuance of share-based awards and amortization thereon has no effect on the Company's consolidated shareholders' equity.

Share-Based Compensation Expense

The following tables present pre-tax and after-tax share-based compensation expense recognized as well as the unrecognized compensation cost associated with unvested awards and the weighted average period over which it is expected to be recognized.

	Year Ended December 31,		
	2019	2018	2017
Pre-Tax			
Stock options and SARs	$ 12,866	$ 16,272	$ 18,536
Restricted share and unit awards	38,988	34,025	46,884
Performance awards	8,949	4,414	—
ESPP	3,045	1,224	2,443
Total	$ 63,848	$ 55,935	$ 67,863
After-Tax			
Stock options and SARs	$ 11,450	$ 14,894	$ 16,219
Restricted share and unit awards	32,999	29,044	37,708
Performance awards	8,295	4,127	—
ESPP	2,758	1,114	2,171
Total	$ 55,502	$ 49,179	$ 56,098

	December 31, 2019		
	Stock Options and SARs	Restricted Common Shares and Units	Performance Common Shares and Units
Unrecognized compensation cost related to unvested awards	$ 12,823	$ 39,606	$ 8,893
Weighted average recognition period (years)	1.23	1.31	1.06

22. Retirement Plans

For purposes of providing employees with retirement benefits, the Company maintains defined contribution retirement plans. Contributions are based on the participants' eligible compensation. For 2019, 2018 and 2017, the Company expensed $44.8 million, $40.8 million and $40.7 million, respectively, related to these retirement plans.

23. 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 December 31, 2019, 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.

24. Statutory Information

The Company's insurance and reinsurance subsidiaries are subject to insurance and/or reinsurance laws and regulations in the jurisdictions in which they operate. These regulations include certain restrictions on the amount of dividends or other distributions available to shareholders without prior approval of the insurance regulatory authorities.

The actual and required statutory capital and surplus for the Company's principal operating subsidiaries at December 31, 2019 and 2018:

	December 31,	
	2019	2018
Actual capital and surplus (1):		
Bermuda	$ 13,511,729	$ 11,605,652
Ireland	721,439	653,055
United States	4,440,848	4,195,477
United Kingdom	748,276	386,892
Canada	61,351	59,096
Required capital and surplus:		
Bermuda	$ 5,492,968	$ 4,718,345
Ireland	542,703	429,117
United States	1,697,640	1,783,268
United Kingdom	349,328	271,864
Canada	32,763	33,189

(1) Such amounts include ownership interests in affiliated insurance and reinsurance subsidiaries.

There were no state-prescribed or permitted regulatory accounting practices for any of the Company's insurance or reinsurance entities that resulted in reported statutory surplus that differed from that which would have been reported under the prescribed practices of the respective regulatory authorities, including the National Association of Insurance Commissioners. The differences between statutory financial statements and statements prepared in accordance with GAAP vary by jurisdiction, however, with the primary differences being that statutory financial statements may not reflect deferred acquisition costs, certain net deferred tax assets, goodwill and intangible assets, unrealized appreciation or depreciation on debt securities and certain unauthorized reinsurance recoverables and include contingency reserves.

The statutory net income (loss) for the Company's principal operating subsidiaries for 2019, 2018 and 2017 was as follows:

	Year Ended December 31,		
	2019	2018	2017
Statutory net income (loss):			
Bermuda	$ 1,876,416	$ 919,554	$ 881,665
Ireland	26,367	29,223	(14,438)
United States	481,188	292,831	500,412
United Kingdom	(17,423)	(18,467)	(33,257)
Canada	(1,023)	2,525	158

Bermuda

The Company has two Bermuda based subsidiaries: Arch Re Bermuda, a Class 4 insurer and long-term insurer, and Watford, a Class 4 insurer. Under the Bermuda Insurance Act 1978 (the "Insurance Act"), these subsidiaries are required to maintain minimum statutory capital and surplus equal to the greater of a minimum solvency margin and the enhanced capital requirement as determined by the Bermuda Monetary Authority ("BMA"). The enhanced capital requirement is calculated based on the Bermuda Solvency Capital Requirement model, a risk-based model that takes into account the risk characteristics of different aspects of the company's business. At December 31, 2019 and 2018, all such requirements were met.

The ability of these subsidiaries to pay dividends is limited under Bermuda law and regulations. Under the Insurance Act, Arch Re Bermuda is restricted with respect to the payment of dividends. Arch Re Bermuda is prohibited from declaring or paying in any financial year dividends of more than 25% of its total statutory capital and surplus (as shown on its previous financial year's statutory balance sheet) unless it files, at least seven days before payment of such dividends, with the Bermuda Monetary Authority an affidavit stating that it will continue to meet the required margins following the declaration of those dividends. Accordingly, Arch Re Bermuda can pay approximately $3.10 billion to Arch Capital during 2020 without providing an affidavit to the BMA.

Ireland

The Company has two Irish subsidiaries: Arch Re Europe, an authorized life and non-life reinsurer, and Arch Insurance (EU), an authorized non-life insurer. Irish authorized reinsurers and insurers, such as Arch Re Europe and Arch Insurance (EU), are also subject to the general body of Irish laws and regulations including the provisions of the Companies Act 2014. Arch Re Europe and Arch Insurance (EU) are subject to the supervision of the Central Bank of Ireland ("CBOI") and must comply with Irish insurance acts and regulations as well as with directions and guidance issued by the CBOI. These subsidiaries are required to maintain a minimum level of capital. At December 31, 2019 and 2018, these requirements were met.

The amount of dividends these subsidiaries are permitted to declare is limited to accumulated, realized profits, so far as not previously utilized by distribution or capitalization, less its accumulated, realized losses, so far as not previously written off in a reduction or reorganization of capital duly made. The solvency and capital requirements must still be met following any distribution. Dividends or distributions, if any, made by Arch Re Europe would result in an increase in available capital at Arch Re Bermuda.

United States

The Company's U.S. insurance and reinsurance subsidiaries are subject to insurance laws and regulations in the jurisdictions in which they operate. The ability of the Company's regulated insurance subsidiaries to pay dividends or make distributions is dependent on their ability to meet applicable regulatory standards. These regulations include restrictions that limit the amount of dividends or other distributions, such as loans or cash advances, available to shareholders without prior approval of the insurance regulatory authorities.

Dividends or distributions, if any, made by Arch Re U.S. would result in an increase in available capital at Arch-U.S., the Company's U.S. holding company. Arch Re U.S. can declare a maximum of approximately $130.2 million of dividends during 2020 subject to the approval of the Commissioner of the Delaware Department of Insurance.

Arch Mortgage Insurance Company and United Guaranty Residential Insurance Company have each been approved as an eligible mortgage insurer by Fannie Mae and Freddie Mac, subject to maintaining certain ongoing requirements ("eligible mortgage insurers"). In April 2015, the GSEs published comprehensive, revised requirements, known as the Private Mortgage Insurer Eligibility Requirements or "PMIERs." As clarified and revised by the Guidance Letters issued by the GSEs in December 2016 and March 2017, the PMIERs apply to the Company's eligible mortgage insurers, but do not apply to Arch Mortgage Guaranty Company, which is not GSE-approved.

The amount of assets required to satisfy the revised financial requirements of the PMIERs at any point in time will be affected by many factors, including macro-economic conditions, the size and composition of our eligible mortgage insurers' mortgage insurance portfolio at the point in time, and the amount of risk ceded to reinsurers that may be deducted in our calculation of "minimum required assets."

The Company's U.S. mortgage insurance subsidiaries are subject to detailed regulation by their domiciliary and primary regulators, the Wisconsin Office of the Commissioner of Insurance ("Wisconsin OCI") for Arch Mortgage Insurance Company and Arch Mortgage Guaranty Company, the North Carolina Department of Insurance ("NC DOI") for United Guaranty Residential Insurance Company, and by state insurance departments in each state in which they are licensed. As mandated by state insurance laws, mortgage insurers are generally mono-line companies restricted to writing a single type of insurance business, such as mortgage insurance business. Each company is subject to either Wisconsin or North Carolina statutory requirements as to payment of dividends. Generally, both Wisconsin and North Carolina law precludes any dividend before giving at least 30 days' notice to the Wisconsin OCI or NC DOI, as applicable, and prohibits paying any dividend unless it is fair and reasonable to do so. In addition, the state regulators and the GSEs limit or restrict our eligible mortgage insurers' ability to pay stockholder dividends or otherwise return capital to shareholders. Under respective states law, our U.S. mortgage subsidiaries can declare a maximum of approximately $338.9 million of ordinary dividends in 2020, however, dividend capacity is limited by the respective companies unassigned surplus amounts. As of December 31, 2019, the combined unassigned surplus amount of our U.S. mortgage insurance entities would limit the dividend capacity to $177.8 million. In certain instances, approval by the GSEs would be required for dividends or other forms of return of capital to shareholders due to the requirements under PMIERs, including the minimum required assets imposed on our eligible mortgage insurers by the GSEs. Such dividend would result in an increase in available capital at Arch U.S. MI Holdings Inc., a subsidiary of Arch-U.S.

Mortgage insurance companies licensed in Wisconsin or North Carolina are required to establish contingency loss reserves for purposes of statutory accounting in an amount equal to at least 50% of net earned premiums. These amounts generally cannot be withdrawn for a period of 10 years and are separate liabilities for statutory accounting purposes, which affects the ability to pay dividends. However, with prior regulatory approval, a mortgage insurance company may make early withdrawals from the contingency reserve when incurred losses exceed 35% of net premiums earned in a calendar year.

Under Wisconsin and North Carolina law, as well as that of 14 other states, a mortgage insurer must maintain a minimum amount of statutory capital relative to its risk in force in order for the mortgage insurer to continue to write new business. While formulations of minimum capital vary in certain jurisdictions, the most common measure applied allows for a maximum risk-to-capital ratio of 25 to 1. Wisconsin and North Carolina both require a mortgage insurer to maintain a "minimum policyholder position" calculated in accordance with their respective regulations. Policyholders' position consists primarily of statutory policyholders' surplus plus the statutory contingency reserve, less ceded reinsurance. While the statutory contingency reserve is reported as a liability on the statutory balance sheet, for risk-to-capital ratio calculations, it is included as capital for purposes of statutory capital.

United Kingdom

The Prudential Regulation Authority ("PRA") and the Financial Conduct Authority ("FCA") regulate insurance and reinsurance companies and the FCA regulates firms carrying on insurance mediation activities operating in the U.K., both under the Financial Services and Markets Act 2000. The Company's European insurance operations are conducted through Arch Insurance (U.K.), Arch Syndicate 2012 and Barbican Syndicate 1955. Arch Syndicate 2012 has one corporate member, Arch Syndicate Investments Ltd. ("ASIL"), and is managed by Arch Underwriting at Lloyd's Ltd ("AUAL"). The syndicates managed by BMAL have 11 corporate members. BMAL is the managing agent of Barbican Syndicate 1955. Arch Syndicate 2012 and Barbican Syndicate 1955 provide access to Lloyd's extensive distribution network and worldwide licenses. All U.K. companies are also subject to a range of statutory provisions, including the laws and regulations of the Companies Acts 2006 (as amended) (the "U.K. Companies Acts").

Arch Insurance (U.K.), AUAL (on behalf of itself, Arch Syndicate 2012 and ASIL) and BMAL must maintain a margin of solvency at all times under the Solvency II Directive from the European Insurance and Occupational Pensions Authority. The regulations stipulate that insurers are required to maintain the minimum capital requirement and solvency capital requirement at all times. The capital requirements are calculated by reference to standard formulae defined in Solvency II. At December 31, 2019 and 2018, our subsidiaries were in compliance with these requirements.

As corporate members of Lloyd's, ASIL and others are subject to the oversight of the Council of Lloyd's. The capital required to support a Syndicate's underwriting capacity, or funds at Lloyd's, is assessed annually and is determined by Lloyd's in accordance with the capital adequacy rules established by the PRA. The Company has provided capital to support the underwriting of Arch Syndicate 2012 and Barbican Syndicate 1955 in the form of pledged assets provided by Arch Re Bermuda. The amount which the Company provides as funds at Lloyd's is not available for distribution to the Company for the payment of dividends. Lloyd's is supervised by the PRA and required to implement certain rules prescribed by the PRA under the Lloyd's Act of 1982 regarding the operation of the Lloyd's market. With respect to managing agents and corporate members, Lloyd's prescribes certain minimum standards relating to management and control, solvency and other requirements and monitors managing agents' compliance with such standards.

Under U.K. law, all U.K. companies are restricted from declaring a dividend to their shareholders unless they have "profits available for distribution." The calculation as to whether a company has sufficient profits is based on its accumulated realized profits minus its accumulated realized losses. U.K. insurance regulatory laws do not prohibit the payment of dividends, but the PRA or FCA, as applicable, requires that insurance companies and insurance intermediaries maintain certain solvency margins and may restrict the payment of a dividend by Arch Insurance (U.K.), AUAL, ASIL and BMAL.

Canada

Arch Insurance Canada and the Canadian branch of Arch Re U.S. ("Arch Re Canada") are subject to federal, as well as provincial and territorial, regulation in Canada. The Office of the Superintendent of Financial Institutions ("OSFI") is the federal regulatory body that, under the Insurance Companies Act (Canada), regulates federal Canadian and non-Canadian insurance companies operating in Canada. Arch Insurance Canada and Arch Re Canada are subject to regulation in the provinces and territories in which they underwrite insurance/ reinsurance, and the primary goal of insurance/reinsurance regulation at the provincial and territorial levels is to govern the market conduct of insurance/reinsurance companies. Arch Insurance Canada is licensed to carry on insurance business by OSFI and in each province and territory. Arch Re Canada is licensed to carry-on reinsurance business by OSFI and in the provinces of Ontario and Quebec.

Under the Insurance Companies Act (Canada), Arch Insurance Canada is required to maintain an adequate amount of capital in Canada, calculated in accordance with a test promulgated by OSFI called the Minimum Capital Test ("MCT"), and Arch Re Canada is required to maintain an adequate margin of assets over liabilities in Canada, calculated in accordance with a test promulgated by OSFI called the Branch Adequacy of Assets Test. Dividends or distributions, if any, made by Arch Insurance Canada would result in an increase in available capital at Arch Insurance Company (see "—United States" section).

25. Unaudited Condensed Quarterly Financial Information

The following table summarizes the 2019 and 2018 unaudited condensed quarterly financial information:

	Fourth Quarter	Third Quarter	Second Quarter	First Quarter
Year Ended December 31, 2019				
Net premiums written	$ 1,455,453	$ 1,613,457	$ 1,444,898	$ 1,525,259
Net premiums earned	1,515,882	1,438,023	1,463,727	1,368,866
Net investment income	154,263	161,488	155,038	156,949
Net realized gains (losses)	41,474	62,518	120,806	141,565
Net impairment losses recognized in earnings	(644)	(1,163)	(49)	(1,309)
Underwriting income (loss)	251,421	231,262	293,134	260,148
Net income (loss) attributable to Arch	326,384	392,453	468,954	448,528
Preferred dividends	(10,403)	(10,403)	(10,403)	(10,403)
Net income (loss) available to Arch common shareholders	315,981	382,050	458,551	438,125
Net income (loss) per common share -- basic	$ 0.78	$ 0.95	$ 1.14	$ 1.09
Net income (loss) per common share -- diluted	$ 0.76	$ 0.92	$ 1.12	$ 1.07
Year Ended December 31, 2018				
Net premiums written	$ 1,301,754	$ 1,333,553	$ 1,298,896	$ 1,412,544
Net premiums earned	1,369,435	1,290,878	1,336,763	1,234,899
Net investment income	157,217	144,024	135,668	126,724
Net realized gains (losses)	(166,030)	(51,705)	(76,611)	(110,998)
Net impairment losses recognized in earnings	(1,705)	(492)	(470)	(162)
Underwriting income (loss)	166,955	234,581	235,465	236,997
Net income (loss) attributable to Arch	136,494	227,408	243,646	150,423
Preferred dividends	(10,403)	(10,402)	(10,403)	(10,437)
Net income (loss) available to Arch common shareholders	126,091	217,006	233,243	137,276
Net income (loss) per common share -- basic	$ 0.31	$ 0.54	$ 0.58	$ 0.34
Net income (loss) per common share -- diluted	$ 0.31	$ 0.53	$ 0.56	$ 0.33

26. Guarantor Financial Information

The following tables present condensed consolidating balance sheets at December 31, 2019 and 2018 and condensed consolidating statements of income, comprehensive income and cash flows for 2019, 2018 and 2017 for Arch Capital, Arch-U.S., a 100% owned subsidiary of Arch Capital, and Arch Capital's other subsidiaries.

	December 31, 2019				
Condensed Consolidating Balance Sheet	Arch Capital (Parent Guarantor)	Arch-U.S. (Subsidiary Issuer)	Other Arch Capital Subsidiaries	Consolidating Adjustments and Eliminations	Arch Capital Consolidated
Assets					
Total investments	$ 42	$ 692,606	$ 23,748,432	$ (38,834)	$ 24,402,246
Cash	18,113	54,518	653,599	—	726,230
Investments in subsidiaries	11,786,861	4,347,806	—	(16,134,667)	—
Due from subsidiaries and affiliates	17	200,635	1,901,865	(2,102,517)	—
Premiums receivable	—	—	2,547,130	(768,413)	1,778,717
Reinsurance recoverable on unpaid and paid losses and loss adjustment expenses	—	—	9,711,773	(5,364,957)	4,346,816
Contractholder receivables	—	—	2,119,460	—	2,119,460
Ceded unearned premiums	—	—	2,230,164	(995,481)	1,234,683
Deferred acquisition costs	—	—	675,917	(42,517)	633,400
Goodwill and intangible assets	—	—	738,083	—	738,083
Other assets	20,461	32,187	1,981,598	(128,520)	1,905,726
Total assets	$ 11,825,494	$ 5,327,752	$ 46,308,021	$ (25,575,906)	$ 37,885,361
Liabilities					
Reserve for losses and loss adjustment expenses	$ —	$ —	$ 19,028,538	$ (5,136,696)	$ 13,891,842
Unearned premiums	—	—	5,335,030	(995,481)	4,339,549
Reinsurance balances payable	—	—	1,435,485	(768,413)	667,072
Contractholder payables	—	—	2,119,460	—	2,119,460
Collateral held for insured obligations	—	—	206,698		206,698
Senior notes	297,254	494,831	1,114,541	(35,000)	1,871,626
Revolving credit agreement borrowings	—	—	484,287	—	484,287
Due to subsidiaries and affiliates	—	536,805	1,565,712	(2,102,517)	—
Other liabilities	30,869	33,267	2,324,793	(399,654)	1,989,275
Total liabilities	328,123	1,064,903	33,614,544	(9,437,761)	25,569,809
Redeemable noncontrolling interests	—	—	58,882	(3,478)	55,404
Shareholders' Equity					
Total shareholders' equity available to Arch	11,497,371	4,262,849	11,871,818	(16,134,667)	11,497,371
Non-redeemable noncontrolling interests	—	—	762,777	—	762,777
Total shareholders' equity	11,497,371	4,262,849	12,634,595	(16,134,667)	12,260,148
Total liabilities, noncontrolling interests and shareholders' equity	$ 11,825,494	$ 5,327,752	$ 46,308,021	$ (25,575,906)	$ 37,885,361

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

	December 31, 2018				
Condensed Consolidating Balance Sheet	**Arch Capital (Parent Guarantor)**	**Arch-U.S. (Subsidiary Issuer)**	**Other Arch Capital Subsidiaries**	**Consolidating Adjustments and Eliminations**	**Arch Capital Consolidated**
Assets					
Total investments	$ 104	$ 452,674	$ 21,307,206	$ (14,700)	$ 21,745,284
Cash	6,125	5,940	634,491	—	646,556
Investments in subsidiaries	9,735,256	3,999,243	—	(13,734,499)	—
Due from subsidiaries and affiliates	9	2	1,802,686	(1,802,697)	—
Premiums receivable	—	—	1,834,389	(535,239)	1,299,150
Reinsurance recoverable on unpaid and paid losses and loss adjustment expenses	—	—	8,618,660	(5,699,288)	2,919,372
Contractholder receivables	—	—	2,079,111	—	2,079,111
Ceded unearned premiums	—	—	1,730,262	(754,793)	975,469
Deferred acquisition costs	—	—	618,535	(48,961)	569,574
Goodwill and intangible assets	—	—	634,920	—	634,920
Other assets	12,588	80,949	1,466,438	(211,082)	1,348,893
Total assets	$ 9,754,082	$ 4,538,808	$ 40,726,698	$ (22,801,259)	$ 32,218,329
Liabilities					
Reserve for losses and loss adjustment expenses	$ —	$ —	$ 17,345,142	$ (5,491,845)	$ 11,853,297
Unearned premiums	—	—	4,508,429	(754,793)	3,753,636
Reinsurance balances payable	—	—	928,346	(535,239)	393,107
Contractholder payables	—	—	2,079,111	—	2,079,111
Collateral held for insured obligations	—	—	236,630	—	236,630
Senior notes	297,150	494,723	941,655	—	1,733,528
Revolving credit agreement borrowings	—	—	455,682	—	455,682
Due to subsidiaries and affiliates	—	536,805	1,265,892	(1,802,697)	—
Other liabilities	17,105	26,270	1,699,768	(467,484)	1,275,659
Total liabilities	314,255	1,057,798	29,460,655	(9,052,058)	21,780,650
Redeemable noncontrolling interests	—	—	220,992	(14,700)	206,292
Shareholders' Equity					
Total shareholders' equity available to Arch	9,439,827	3,481,010	10,253,491	(13,734,501)	9,439,827
Non-redeemable noncontrolling interests	—	—	791,560	—	791,560
Total shareholders' equity	9,439,827	3,481,010	11,045,051	(13,734,501)	10,231,387
Total liabilities, noncontrolling interests and shareholders' equity	$ 9,754,082	$ 4,538,808	$ 40,726,698	$ (22,801,259)	$ 32,218,329

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

Condensed Consolidating Statement of Income and Comprehensive Income	Year Ended December 31, 2019				
	Arch Capital (Parent Guarantor)	Arch-U.S. (Subsidiary Issuer)	Other Arch Capital Subsidiaries	Consolidating Adjustments and Eliminations	Arch Capital Consolidated
Revenues					
Net premiums earned	$ —	$ —	$ 5,786,498	$ —	$ 5,786,498
Net investment income	212	14,270	706,038	(92,782)	627,738
Net realized gains (losses)	—	25,313	352,771	(11,721)	366,363
Net impairment losses recognized in earnings	—	—	(3,165)	—	(3,165)
Other underwriting income	—	—	24,861	—	24,861
Equity in net income (loss) of investments accounted for using the equity method	—	779	122,893	—	123,672
Other income (loss)	(762)	—	2,995	—	2,233
Total revenues	(550)	40,362	6,992,891	(104,503)	6,928,200
Expenses					
Losses and loss adjustment expenses	—	—	3,133,452	—	3,133,452
Acquisition expenses	—	—	840,945	—	840,945
Other operating expenses	—	—	800,997	—	800,997
Corporate expenses	62,701	7,221	10,189	—	80,111
Amortization of intangible assets	—	—	82,104	—	82,104
Interest expense	22,154	47,951	142,662	(91,895)	120,872
Net foreign exchange (gains) losses	1	—	22,188	(1,580)	20,609
Total expenses	84,856	55,172	5,032,537	(93,475)	5,079,090
Income (loss) before income taxes	(85,406)	(14,810)	1,960,354	(11,028)	1,849,110
Income tax (expense) benefit	—	3,696	(159,506)	—	(155,810)
Income (loss) before equity in net income of subsidiaries	(85,406)	(11,114)	1,800,848	(11,028)	1,693,300
Equity in net income of subsidiaries	1,721,725	564,657	—	(2,286,382)	—
Net income	1,636,319	553,543	1,800,848	(2,297,410)	1,693,300
Net (income) loss attributable to noncontrolling interests	—	—	(57,868)	887	(56,981)
Net income available to Arch	1,636,319	553,543	1,742,980	(2,296,523)	1,636,319
Preferred dividends	(41,612)	—	—	—	(41,612)
Net income available to Arch common shareholders	$ 1,594,707	$ 553,543	$ 1,742,980	$ (2,296,523)	$ 1,594,707
Comprehensive income (loss) available to Arch	$ 2,027,129	$ 751,210	$ 2,124,455	$ (2,875,665)	$ 2,027,129

Condensed Consolidating Statement of Income and Comprehensive Income	Year Ended December 31, 2018				
	Arch Capital (Parent Guarantor)	Arch-U.S. (Subsidiary Issuer)	Other Arch Capital Subsidiaries	Consolidating Adjustments and Eliminations	Arch Capital Consolidated
Revenues					
Net premiums earned	$ —	$ —	$ 5,231,975	$ —	$ 5,231,975
Net investment income	49	3,902	649,394	(89,712)	563,633
Net realized gains (losses)	29	(2,676)	(410,014)	7,317	(405,344)
Net impairment losses recognized in earnings	—	—	(2,829)	—	(2,829)
Other underwriting income	—	—	15,073	—	15,073
Equity in net income (loss) of investments accounted for using the equity method	—	—	45,641	—	45,641
Other income (loss)	1,918	—	501	—	2,419
Total revenues	1,996	1,226	5,529,741	(82,395)	5,450,568
Expenses					
Losses and loss adjustment expenses	—	—	2,890,106	—	2,890,106
Acquisition expenses	—	—	805,135	—	805,135
Other operating expenses	—	—	677,809	—	677,809
Corporate expenses	64,279	2,422	12,293	—	78,994
Amortization of intangible assets	—	—	105,670	—	105,670
Interest expense	22,147	48,103	138,672	(88,438)	120,484
Net foreign exchange (gains) losses	30	—	(59,607)	(9,825)	(69,402)
Total expenses	86,456	50,525	4,570,078	(98,263)	4,608,796
Income (loss) before income taxes	(84,460)	(49,299)	959,663	15,868	841,772
Income tax (expense) benefit	—	13,314	(127,265)	—	(113,951)
Income (loss) before equity in net income of subsidiaries	(84,460)	(35,985)	832,398	15,868	727,821
Equity in net income of subsidiaries	842,431	388,260	—	(1,230,691)	—
Net income	757,971	352,275	832,398	(1,214,823)	727,821
Net (income) loss attributable to noncontrolling interests	—	—	28,875	1,275	30,150
Net income available to Arch	757,971	352,275	861,273	(1,213,548)	757,971
Preferred dividends	(41,645)	—	—	—	(41,645)
Loss on repurchase of preferred shares	(2,710)	—	—	—	(2,710)
Net income available to Arch common shareholders	$ 713,616	$ 352,275	$ 861,273	$ (1,213,548)	$ 713,616
Comprehensive income (loss) available to Arch	$ 611,003	$ 292,973	$ 730,828	$ (1,023,801)	$ 611,003

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

Condensed Consolidating Statement of Income and Comprehensive Income	Year Ended December 31, 2017 Arch Capital (Parent Guarantor)	Arch-U.S. (Subsidiary Issuer)	Other Arch Capital Subsidiaries	Consolidating Adjustments and Eliminations	Arch Capital Consolidated
Revenues					
Net premiums earned	$ —	$ —	$ 4,844,532	$ —	$ 4,844,532
Net investment income	243	1,420	559,963	(90,754)	470,872
Net realized gains (losses)	—	—	149,141	—	149,141
Net impairment losses recognized in earnings	—	—	(7,138)	—	(7,138)
Other underwriting income	—	—	30,253	—	30,253
Equity in net income (loss) of investments accounted for using the equity method	—	—	142,286	—	142,286
Other income (loss)	(482)	—	(2,089)	—	(2,571)
Total revenues	(239)	1,420	5,716,948	(90,754)	5,627,375
Expenses					
Losses and loss adjustment expenses	—	—	2,967,446	—	2,967,446
Acquisition expenses	—	—	775,458	—	775,458
Other operating expenses	—	—	684,451	—	684,451
Corporate expenses	67,450	4,152	12,150	—	83,752
Amortization of intangible assets	—	—	125,778	—	125,778
Interest expense	23,560	47,993	135,342	(89,464)	117,431
Net foreign exchange (gains) losses	2	—	68,900	46,880	115,782
Total expenses	91,012	52,145	4,769,525	(42,584)	4,870,098
Income (loss) before income taxes	(91,251)	(50,725)	947,423	(48,170)	757,277
Income tax (expense) benefit	—	10,333	(137,901)	—	(127,568)
Income (loss) before equity in net income of subsidiaries	(91,251)	(40,392)	809,522	(48,170)	629,709
Equity in net income of subsidiaries	710,529	303,991	—	(1,014,520)	—
Net income	619,278	263,599	809,522	(1,062,690)	629,709
Net (income) loss attributable to noncontrolling interests	—	—	(11,721)	1,290	(10,431)
Net income available to Arch	619,278	263,599	797,801	(1,061,400)	619,278
Preferred dividends	(46,041)	—	—	—	(46,041)
Loss on repurchase of preferred shares	(6,735)	—	—	—	(6,735)
Net income available to Arch common shareholders	$ 566,502	$ 263,599	$ 797,801	$ (1,061,400)	$ 566,502
Comprehensive income (loss) available to Arch	$ 851,863	$ 288,752	$ 983,475	$ (1,272,227)	$ 851,863

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

	Year Ended December 31, 2019				
Condensed Consolidating Statement of Cash Flows	**Arch Capital (Parent Guarantor)**	**Arch-U.S. (Subsidiary Issuer)**	**Other Arch Capital Subsidiaries**	**Consolidating Adjustments and Eliminations**	**Arch Capital Consolidated**
Operating Activities					
Net Cash Provided By (Used For) Operating Activities	$ 52,487	$ 486,252	$ 2,138,195	$ (628,475)	$ 2,048,459
Investing Activities					
Purchases of fixed maturity investments	—	(878,577)	(29,347,333)	172,133	(30,053,777)
Purchases of equity securities	—	(155,890)	(726,820)	70,743	(811,967)
Purchases of other investments	—	(28,490)	(1,442,055)	—	(1,470,545)
Proceeds from the sales of fixed maturity investments	—	806,603	27,937,616	(148,354)	28,595,865
Proceeds from the sales of equity securities	—	7,441	493,120	(70,743)	429,818
Proceeds from the sales, redemptions and maturities of other investments	—	1,634	1,207,925	—	1,209,559
Proceeds from redemptions and maturities of fixed maturity investments	—	—	643,265	—	643,265
Net settlements of derivative instruments	—	—	59,982	—	59,982
Net (purchases) sales of short-term investments	61	34,372	5,400	—	39,833
Change in cash collateral related to securities lending	—	—	(62,193)	—	(62,193)
Contributions to subsidiaries	(2,121)	(6,000)	(57,039)	65,160	—
Issuance of intercompany loans	—	(200,000)	(87,783)	287,783	—
Purchases of fixed assets	(162)	—	(37,675)	—	(37,837)
Other	—	(18,767)	(329,719)	—	(348,486)
Net Cash Provided By (Used For) Investing Activities	(2,222)	(437,674)	(1,743,309)	376,722	(1,806,483)
Financing Activities					
Purchases of common shares under share repurchase program	(2,871)	—	—	—	(2,871)
Proceeds from common shares issued, net	6,203	—	65,160	(65,160)	6,203
Proceeds from intercompany borrowings	—	—	287,783	(287,783)	—
Proceeds from borrowings	—	—	235,083	(35,000)	200,083
Repayments of borrowings	—	—	(49,182)	—	(49,182)
Change in cash collateral related to securities lending	—	—	62,193	—	62,193
Change in third party investment in non-redeemable noncontrolling interests	—	—	(75,056)	—	(75,056)
Change in third party investment in redeemable noncontrolling interests	—	—	(173,103)	11,221	(161,882)
Dividends paid to redeemable noncontrolling interests	—	—	(13,402)	887	(12,515)
Dividends paid to parent (1)	—	—	(627,588)	627,588	—
Other	—	—	(6,023)	—	(6,023)
Preferred dividends paid	(41,612)	—	—	—	(41,612)
Net Cash Provided By (Used For) Financing Activities	(38,280)	—	(294,135)	251,753	(80,662)
Effects of exchange rate changes on foreign currency cash and restricted cash	—	—	17,741	—	17,741
Increase (decrease) in cash and restricted cash	11,985	48,578	118,492	—	179,055
Cash and restricted cash, beginning of year	6,159	5,940	712,544	—	724,643
Cash and restricted cash, end of period	$ 18,144	$ 54,518	$ 831,036	$ —	$ 903,698

(1) Included in net cash provided by (used for) operating activities in the Arch Capital (Parent Guarantor) and/or Arch-U.S. (Subsidiary Issuer) columns.

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

	Year Ended December 31, 2018				
Condensed Consolidating Statement of Cash Flows	**Arch Capital (Parent Guarantor)**	**Arch-U.S. (Subsidiary Issuer)**	**Other Arch Capital Subsidiaries**	**Consolidating Adjustments and Eliminations**	**Arch Capital Consolidated**
Operating Activities					
Net Cash Provided By (Used For) Operating Activities	$ 324,319	$ 481,751	$ 1,703,181	$ (949,929)	$ 1,559,322
Investing Activities					
Purchases of fixed maturity investments	—	(906,482)	(33,662,541)	1,241,363	(33,327,660)
Purchases of equity securities	—	(44,830)	(956,319)	—	(1,001,149)
Purchases of other investments	—	—	(2,014,622)	—	(2,014,622)
Proceeds from the sales of fixed maturity investments	—	535,947	32,218,687	(1,241,363)	31,513,271
Proceeds from the sales of equity securities	—	—	1,118,445	—	1,118,445
Proceeds from the sales, redemptions and maturities of other investments	—	—	1,561,958	—	1,561,958
Proceeds from redemptions and maturities of fixed maturity investments	—	—	892,755	—	892,755
Net settlements of derivative instruments	—	—	44,699	—	44,699
Net (purchases) sales of short-term investments	96,476	7,674	381,323	—	485,473
Change in cash collateral related to securities lending	—	—	180,883	—	180,883
Contributions to subsidiaries	—	(98,500)	98,500	—	—
Purchases of fixed assets	(110)	—	(29,699)	—	(29,809)
Other	(4)	—	21,740	—	21,736
Net Cash Provided By (Used For) Investing Activities	96,362	(506,191)	(144,191)	—	(554,020)
Financing Activities					
Redemption of preferred shares	(92,555)	—	—	—	(92,555)
Purchases of common shares under share repurchase program	(282,762)	—	—	—	(282,762)
Proceeds from common shares issued, net	(7,608)	—	—	—	(7,608)
Proceeds from borrowings	—	—	218,259	—	218,259
Repayments of borrowings	—	—	(576,401)	—	(576,401)
Change in cash collateral related to securities lending	—	—	(180,883)	—	(180,883)
Dividends paid to redeemable noncontrolling interests	—	—	(19,264)	1,275	(17,989)
Dividends paid to parent (1)	—	—	(948,654)	948,654	—
Other	—	—	(7,226)	—	(7,226)
Preferred dividends paid	(41,645)	—	—	—	(41,645)
Net Cash Provided By (Used For) Financing Activities	(424,570)	—	(1,514,169)	949,929	(988,810)
Effects of exchange rate changes on foreign currency cash and restricted cash	—	—	(19,133)	—	(19,133)
Increase (decrease) in cash and restricted cash	(3,889)	(24,440)	25,688	—	(2,641)
Cash and restricted cash, beginning of year	10,048	30,380	686,856	—	727,284
Cash and restricted cash, end of period	$ 6,159	$ 5,940	$ 712,544	$ —	$ 724,643

(1) Included in net cash provided by (used for) operating activities in the Arch Capital (Parent Guarantor) and/or Arch-U.S. (Subsidiary Issuer) columns.

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

Condensed Consolidating Statement of Cash Flows	Year Ended December 31, 2017				
	Arch Capital (Parent Guarantor)	Arch-U.S. (Subsidiary Issuer)	Other Arch Capital Subsidiaries	Consolidating Adjustments and Eliminations	Arch Capital Consolidated
Operating Activities					
Net Cash Provided By (Used For) Operating Activities	$ 159,130	$ (10,289)	$ 1,649,751	$ (703,714)	$ 1,094,878
Investing Activities					
Purchases of fixed maturity investments	—	—	(36,806,913)	—	(36,806,913)
Purchases of equity securities	—	—	(1,021,016)	—	(1,021,016)
Purchases of other investments	—	—	(2,020,624)	—	(2,020,624)
Proceeds from the sales of fixed maturity investments	—	—	35,686,779	—	35,686,779
Proceeds from the sales of equity securities	—	—	1,056,401	—	1,056,401
Proceeds from the sales, redemptions and maturities of other investments	—	—	1,528,617	—	1,528,617
Proceeds from redemptions and maturities of fixed maturity investments	—	—	907,417	—	907,417
Net settlements of derivative instruments	—	—	(28,563)	—	(28,563)
Proceeds from investment in joint venture	—	—	—	—	—
Net (purchases) sales of short-term investments	(93,864)	(4,586)	(636,104)	—	(734,554)
Change in cash collateral related to securities lending	—	—	12,540	—	12,540
Contributions to subsidiaries	20,457	(73,700)	(423,998)	477,241	—
Issuance of intercompany loans	—	—	(47,000)	47,000	—
Repayment of intercompany loans	—	47,000	80,840	(127,840)	—
Purchases of fixed assets	(18)	—	(22,823)	—	(22,841)
Other	—	—	111,516	(20,641)	90,875
Net Cash Provided By (Used For) Investing Activities	(73,425)	(31,286)	(1,622,931)	375,760	(1,351,882)
Financing Activities					
Proceeds from issuance of Series C preferred shares issued, net	319,694	—	—	—	319,694
Redemption of preferred shares	(230,000)	—	—	—	(230,000)
Purchases of common shares under share repurchase program	—	—	—	—	—
Proceeds from common shares issued, net	(21,048)	—	477,244	(477,244)	(21,048)
Proceeds from intercompany borrowings	—	—	47,000	(47,000)	—
Proceeds from borrowings	—	—	253,415	—	253,415
Repayments of intercompany borrowings	—	—	(127,840)	127,840	—
Repayments of borrowings	(100,000)	—	(97,000)	—	(197,000)
Change in cash collateral relating to securities lending	—	—	(12,540)	—	(12,540)
Dividends paid to redeemable noncontrolling	—	—	(19,264)	1,275	(17,989)
Dividends paid to parent (1)	—	—	(702,442)	702,442	—
Other	—	—	(72,537)	20,641	(51,896)
Preferred dividends paid	(46,041)	—	—	—	(46,041)
Net Cash Provided By (Used For) Financing Activities	(77,395)	—	(253,964)	327,954	(3,405)
Effects of exchange rate changes on foreign currency cash and restricted cash	—	—	18,124	—	18,124
Increase (decrease) in cash and restricted cash	8,310	(41,575)	(209,020)	—	(242,285)
Cash and restricted cash, beginning of year	1,738	71,955	895,876	—	969,569
Cash and restricted cash, end of period	$ 10,048	$ 30,380	$ 686,856	$ —	$ 727,284

(1) Included in net cash provided by (used for) operating activities in the Arch Capital (Parent Guarantor) and/or Arch-U.S. (Subsidiary Issuer) columns.

27. Subsequent Event

On February 25, 2020, the Company announced that it has entered into a share purchase agreement with Natixis to purchase a 29.5% stake in Coface, a France-based leader in the global trade credit insurance market. The transaction will be completed at a price of €10.70 per share (dividend until closing attached), corresponding to a transaction value of approximately €480 million based on the current number of shares. As part of the transaction, Natixis' seven representatives on Coface's board of directors will resign and be replaced by four Arch nominees. Among other things, this transaction remains subject to antitrust and regulatory approvals, including in particular, approval by the French prudential regulator, the Autorité de Controle Prudentiel et de Résolution.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

In connection with the filing of this Form 10-K, our management, including the Chief Executive Officer and Chief Financial Officer, conducted an evaluation, as of December 31, 2019, for the purposes set forth in the applicable rules under the Securities and Exchange Act of 1934, as amended (the "Exchange Act"). Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that the disclosure controls and procedures are effective.

We continue to enhance our operating procedures and internal controls (including information technology initiatives and controls over financial reporting) 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.

Management's Annual Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2019. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations (COSO) of the Treadway Commission in *Internal Control-Integrated Framework (2013)*.

Based on our assessment, management determined that, as of December 31, 2019, our internal control over financial reporting was effective. The effectiveness of our internal control over financial reporting as of December 31, 2019 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report included in Item 8.

Changes in Internal Control Over Financial Reporting

There have been no changes in internal control over financial reporting that occurred in connection with our evaluation required pursuant to Rules 13a-15 and 15d-15 under the Exchange Act during the fiscal quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

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 year ended December 31, 2019, 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.

Subsequent Event

On February 25, 2020, the Company announced that it has entered into a share purchase agreement with Natixis to purchase a 29.5% stake in Coface, a France-based leader in the global trade credit insurance market. The transaction will be completed at a price of €10.70 per share (dividend until closing attached), corresponding to a transaction value of approximately €480 million based on the current number of shares. As part of the transaction, Natixis' seven representatives on Coface's board of directors will resign and be replaced by four Arch nominees. Among other things, this transaction remains subject to antitrust and regulatory approvals, including in particular, approval by the French prudential regulator, the Autorité de Controle Prudentiel et de Résolution.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item is incorporated by reference from the information to be included in our definitive proxy statement ("Proxy Statement") for our annual meeting of shareholders to be held in 2020, which we intend to file with the SEC pursuant to Regulation 14A before May 1, 2020. Copies of our code of ethics applicable to our chief executive officer, chief financial officer and principal accounting officer or controller are available free of charge to investors upon written request addressed to the attention of Arch Capital's corporate secretary, Waterloo House, 100 Pitts Bay Road, Pembroke HM 08, Bermuda. In addition, our code of ethics and certain other basic corporate documents, including the charters of our audit committee, compensation committee and nominating committee are posted on our website.

If any substantive amendments are made to the code of ethics or if there is a grant of a waiver, including any implicit waiver, we will disclose the nature of such amendment or waiver on our website or in a report on Form 8-K, to the extent required by applicable law or the rules and regulations of any exchange applicable to us. Our website address is intended to be an inactive, textual reference only and none of the material on our website is incorporated by reference into this report.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated by reference from the information to be included in the Proxy Statement which we intend to file pursuant to Regulation 14A with the SEC before May 1, 2020, which Proxy Statement is incorporated by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Other than the information set forth below, the information required by this item is incorporated by reference from the information to be included in the Proxy Statement which we intend to file pursuant to Regulation 14A with the SEC before May 1, 2020, which Proxy Statement is incorporated by reference.

The following information is as of December 31, 2019:

	Column A	Column B	Column C	
Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Stock Options(1), Warrants and Rights	Weighted-Average Exercise Price of Outstanding Stock Options(1), Warrants and Rights ($)	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column A)	
Equity compensation plans approved by security holders	20,439,797	$ 20.94	28,927,609	
Equity compensation plans not approved by security holders	—	—	—	
Total	20,439,797	$ 20.94	28,927,609	(2)

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(1) Includes all vested and unvested stock options outstanding of 18,853,018 and restricted stock and performance units outstanding of 1,586,779. The weighted average exercise price does not take into account restricted stock units. In addition, the weighted average remaining contractual life of the Company's outstanding exercisable stock options and SARs at December 31, 2019 was 5.0 years.

(2) Includes 2,729,721 common shares remaining available for future issuance under our Employee Share Purchase Plan and 26,197,888 common shares remaining available for future issuance under our equity compensation plans. Shares available for future issuance under our equity compensation plans may be issued in the form of stock options, SARs, restricted shares, restricted share units payable in common shares or cash, share awards in lieu of cash awards, dividend equivalents, performance shares and performance units and other share-based awards. In addition, 7,608,674 common shares, or 26.3% of the 28,927,609 common shares remaining available for future issuance may be issued in connection with full value awards (i.e., awards other than stock options or SARs).

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated by reference from the information to be included in the Proxy Statement which we intend to file pursuant to Regulation 14A with the SEC before May 1, 2020, which Proxy Statement is incorporated by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item is incorporated by reference from the information to be included in our Proxy Statement which we intend to file pursuant to Regulation 14A with the SEC before May 1, 2020, which Proxy Statement is incorporated by reference.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) Financial Statements, Financial Statement Schedules and Exhibits.

1. Financial Statements

Included in Part II – see Item 8 of this report.

2. Financial Statement Schedules

Schedules other than those listed above are omitted for the reason that they are not applicable or the information is provided in Item 8 of this report.

Table of Contents

3. Exhibits

Exhibit Number	Exhibit Description	Incorporated by Reference: Form	Original Number	Date Filed	Filed Herewith
3.1	Memorandum of Association of ACGL	S-4	3.1	September 8, 2000	
3.2	Bye-Laws of ACGL	10-Q	3	August 5, 2016	
3.3	ACGL Certificate of Deposit of Memorandum of Increase of Share Capital	10-K	3.3	February 28, 2011	
4.1.1	Certificate of Designations of Series E Non-Cumulative Preferred Shares	8-K	4.1	September 29, 2016	
4.1.2	Certificate of Designations of Series F Non-Cumulative Preferred Shares	8-K	4.1	August 17, 2017	
4.2.1	Specimen Common Share Certificate	10-K405	4.1	April 2, 2001	
4.2.2	Specimen Series E Non-Cumulative Preferred Share Certificate	8-K	4.2	September 29, 2016	
4.2.3	Specimen Series F Non-Cumulative Preferred Share Certificate	8-K	4.2	August 17, 2017	
4.3.1	Indenture, dated as of May 4, 2004, between ACGL, as issuer, and JPMorgan Chase Bank, N.A. (formerly JPMorgan Chase Bank) (“JPMCB”), as trustee	8-K	99.2	May 7, 2004	
4.3.2	First Supplemental Indenture, dated as of May 4, 2004, between ACGL, as issuer, and JPMCB, as trustee	8-K	99.3	May 7, 2004	
4.3.3	Indenture, dated as of December 13, 2013, among Arch Capital Group (U.S.) Inc. (“Arch U.S.”), as issuer, ACGL, as guarantor, and The Bank of New York Mellon (“BNYM”), as trustee	8-K	4.1	December 13, 2013	
4.3.4	First Supplemental Indenture, dated as of December 13, 2013, among Arch U.S., as issuer, ACGL, as guarantor, and BNYM, as trustee	8-K	4.2	December 13, 2013	
4.3.5	Second Supplemental Indenture, dated as of May 10, 2018, among Arch Capital Finance LLC, as issuer, ACGL, as guarantor, and BNYM, as trustee	8-K	4.1	May 15, 2018	
4.4.1	Deposit Agreement, dated September 29, 2016, between ACGL, as issuer, and American Stock Transfer & Trust Company, LLC (“AST”), as depositary, registrar and transfer agent and as dividend disbursing agent and redemption agent, and the holders from time to time of the depositary receipts	8-K	4.3	September 29, 2016	
4.4.2	Deposit Agreement, dated August 17, 2017, between ACGL, as issuer, and AST, as depositary, registrar and transfer agent and as dividend disbursing agent and redemption agent, and the holders from time to time of the depositary receipts	8-K	4.3	August 17, 2017	
4.5.1	Form of Depositary Receipt, dated September 29, 2016	8-K	4.4	September 29, 2016	
4.5.2	Form of Depositary Receipt, dated August 17, 2017	8-K	4.4	August 17, 2017	
4.6.1	Indenture, dated as of December 8, 2016, among Arch Capital Finance LLC, as issuer, ACGL, as guarantor, and BNYM, as trustee	8-K	4.1	December 9, 2016	
4.6.2	First Supplemental Indenture, dated as of December 8, 2016, among Arch Capital Finance LLC, as issuer, ACGL, as guarantor, and BNYM, as trustee	8-K	4.2	December 9, 2016	
4.7	Description of Securities				X
10.1.1	ACGL 2002 Long Term Incentive and Share Award Plan (“2002 Plan”)†	10-Q	10.1	August 14, 2002	
10.1.2	First Amendment to the 2002 Plan†	10-Q	10.4	November 12, 2003	
10.1.3	Second Amendment to the 2002 Plan†	10-K	10.6	March 2, 2009	
10.2.1	Third Amended and Restated ACGL Incentive Compensation Plan†	10-Q	10.7	August 5, 2016	
10.2.2	First Amendment to Third Amended and Restated ACGL Incentive Compensation Plan†	10-Q	10.1	May 5, 2017	
10.3.1	ACGL 2007 Long Term Incentive and Share Award Plan†	DEF 14A		April 3, 2007	
10.3.2	ACGL 2012 Long Term Incentive and Share Award Plan†	DEF 14A		March 27, 2012	
10.3.3	ACGL 2015 Long Term Incentive and Share Award Plan†	DEF 14A		March 26, 2015	
10.3.4	ACGL 2018 Long Term Incentive and Share Award Plan†	DEF 14A		March 28, 2018	
10.3.5	ACGL Amended and Restated 2007 Employee Share Purchase Plan†	DEF 14A		March 23, 2016	
10.4.1	Restricted Share Unit Agreement, dated as of February 20, 2003, between ACGL and Constantine Iordanou (“February RSU Agreement”)†	10-K	10.7.15	March 10, 2004	
10.4.2	First Amendment to February RSU Agreement dated as of December 9, 2008 grant†	10-K	10.10.9	March 2, 2009	
10.4.3	Second Amendment to February RSU Agreement dated as of July 9, 2009 grant†	10-Q	10.1	November 9, 2009	
10.4.4	Form of Restricted Share Agreement, dated as of May 13, 2015, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Nicolas Papadopoulo, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.2	August 7, 2015	
10.4.5	Form of Restricted Share Agreement, dated as of May 13, 2016, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Nicolas Papadopoulo, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.2	August 5, 2016	
10.4.6	Form of Restricted Share Agreement, dated as of May 4, 2017, between ACGL and each of the Non-Employee Directors of ACGL†	10-Q	10.3	August 4, 2017	

10.4.7	Form of Restricted Share Agreement, dated as of May 8, 2017, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Nicolas Papadopoulo, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.4	August 4, 2017
10.4.8	Form of Restricted Share Agreement, dated as of September 19, 2017, between ACGL and each of Nicolas Papadopoulo and Maamoun Rajeh†	10-K	10.4.13	February 28, 2018
10.4.9	Form of Restricted Share Agreement for Named Executive Officers and certain Executive Officers of ACGL and subsidiaries†	10-Q	10.3	August 8, 2018
10.4.10	Form of Restricted Share Agreement between ACGL and each of the Non-Employee Directors of ACGL†	10-Q	10.6	August 8, 2018
10.4.11	Restricted Share Agreement, dated as of May 9, 2018, between ACGL and Constantine Iordanou†	10-Q	10.7	August 8, 2018
10.5	Form of Performance Restricted Share Agreement for Named Executive Officers and certain Executive Officers of ACGL and subsidiaries†	10-Q	10.5	August 8, 2018
10.6.1	Form of Non-Qualified Stock Option Agreement, dated as of May 13, 2015, between ACGL and each of Constantine Iordanou, Marc Grandisson and W. Preston Hutchings†	10-Q	10.3	August 7, 2015
10.6.2	Non-Qualified Stock Option Agreement, dated as of February 26, 2016, between ACGL and Constantine Iordanou†	10-Q	10.6	August 5, 2016
10.6.3	Form of Non-Qualified Stock Option Agreement, dated as of May 13, 2016, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Nicolas Papadopoulo, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.3	August 5, 2016
10.6.4	Non-Qualified Stock Option Agreement, dated as of February 24, 2017, between ACGL and Constantine Iordanou†	10-Q	10.22	November 3, 2017
10.6.5	Form of Non-Qualified Stock Option Agreement, dated as of May 8, 2017, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Nicolas Papadopoulo, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.5	August 4, 2017
10.6.6	Non-Qualified Stock Option Agreement, dated as of September 19, 2017, between ACGL and Maamoun Rajeh†	10-K	10.5.6	February 28, 2018
10.6.7	Non-Qualified Stock Option Agreement, dated as of September 19, 2017, between ACGL and Nicolas Papadopoulo†	10-K	10.5.7	February 28, 2018
10.6.8	Form of Non-Qualified Stock Option Agreement for Named Executive Officers and certain Executive Officers of ACGL and subsidiaries†	10-Q	10.4	August 8, 2018
10.6.9	Non-Qualified Stock Option Agreement, dated as of May 9, 2018, between ACGL and Constantine Iordanou †	10-Q	10.8	August 8, 2018
10.6.10	Non-Qualified Stock Option Agreement, dated as of March 1, 2018, between ACGL and Constantine Iordanou†	10-Q	10.4	May 9, 2018
10.6.11	Non-Qualified Stock Option Agreement, dated as of April 9, 2018, between ACGL and Marc Grandisson†	10-Q	10.5	May 9, 2018
10.7.1	Form of Share Appreciation Right Agreement, dated as of May 9, 2008, between ACGL and each of Constantine Iordanou, John D. Vollaro, Marc Grandisson, W. Preston Hutchings and Louis T. Petrillo†	10-Q	10.1	November 10, 2008
10.7.2	Form of Share Appreciation Right Agreement, dated as of May 6, 2009, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings and John D. Vollaro†	10-K	10.12.4	February 26, 2010
10.7.3	Share Appreciation Right Agreement, dated as of February 25, 2010, between ACGL and Constantine Iordanou†	10-Q	10.4	November 9, 2012
10.7.4	Form of Share Appreciation Right Agreement, dated as of May 5, 2010, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings and Louis T. Petrillo†	10-Q	10.4	November 8, 2010
10.7.5	Share Appreciation Right Agreement, dated as of May 6, 2011, between ACGL and Marc Grandisson†	10-Q	10.7	November 8, 2011
10.7.6	Share Appreciation Right Agreement, dated as of May 6, 2011, between ACGL and W. Preston Hutchings†	10-Q	10.9	November 8, 2011
10.7.7	Share Appreciation Right Agreement, dated as of May 6, 2011, between ACGL and Constantine Iordanou†	10-Q	10.10	November 8, 2011
10.7.8	Share Appreciation Right Agreement, dated as of May 6, 2011, between ACGL and Louis T. Petrillo†	10-Q	10.12	November 8, 2011
10.7.9	Share Appreciation Right Agreement, dated as of May 6, 2011, between ACGL and Maamoun Rajeh†	10-Q	10.1	November 3, 2017
10.7.10	Share Appreciation Right Agreement dated as of February 29, 2012, between ACGL and Constantine Iordanou†	10-Q	10.5	November 9, 2012
10.7.11	Share Appreciation Right Agreement, dated as of May 9, 2012 between ACGL and Maamoun Rajeh†	10-Q	10.2	November 3, 2017
10.7.12	Form of Share Appreciation Right Agreement, dated as of May 9, 2012, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings and Louis T. Petrillo†	10-Q	10.3	November 9, 2012
10.7.13	Share Appreciation Right Agreement, dated as of July 1, 2012 between ACGL and Maamoun Rajeh†	10-Q	10.4	November 3, 2017

10.7.14	Form of Share Appreciation Right Agreement, dated as of November 12, 2012, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.3	August 9, 2013	
10.7.15	Form of Share Appreciation Right Agreement, dated as of May 9, 2013, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.2	November 8, 2013	
10.7.16	Share Appreciation Right Agreement, dated as of February 28, 2014, between ACGL and Constantine Iordanou†	10-Q	10.6	August 8, 2014	
10.7.17	Form of Share Appreciation Right Agreement, dated as of May 13, 2014, between ACGL and each of Constantine Iordanou, Marc Grandisson, W. Preston Hutchings, Maamoun Rajeh and Louis T. Petrillo†	10-Q	10.3	August 8, 2014	
10.7.18	Share Appreciation Right Agreement, dated as of July 1, 2014, between ACGL and Maamoun Rajeh†	10-Q	10.15	November 3, 2017	
10.7.19	Share Appreciation Right Agreement, dated as of November 6, 2014, between ACGL and Marc Grandisson†	10-Q	10.2	May 8, 2015	
10.7.20	Share Appreciation Right Agreement, dated as of February 27, 2015, between ACGL and Constantine Iordanou†	10-Q	10.5	August 5, 2016	
10.8.1	Employment Agreement, dated as of October 27, 2008, between ACGL and John D. Vollaro†	8-K	10.1	October 28, 2008	
10.8.2	Amendment to Employment Agreement, dated February 27, 2015, between ACGL and John D. Vollaro†	10-Q	10.1	May 8, 2015	
10.8.3	Second Amendment to Employment Agreement, dated as of January 1, 2018, between ACGL and John D. Vollaro†	10-Q	10.1	May 9, 2018	
10.9	Employment Agreement, dated as of February 1, 2018, between ACGL and W. Preston Hutchings†	10-Q	10.2	August 8, 2018	
10.10.1	Service Agreement, dated September 21, 2017 between ACGL and Constantine Iordanou†	8-K	10.1	September 22, 2017	
10.10.2	Agreement, dated March 15, 2019 between ACGL and Constantine Iordanou†	8-K	10.1	March 21, 2019	
10.11	Employment Agreement, dated as of September 19, 2017 between ACGL and Maamoun Rajeh†	10-Q	10.26	November 3, 2017	
10.12	Employment Agreement, dated as of September 19, 2017 between ACGL and Nicholas Papadopoulo†	10-Q	10.27	November 3, 2017	
10.13	Employment Agreement, dated as of May 25, 2018, between ACGL and François Morin†	8-K/A	10.1	July 26, 2018	
10.14	Employment Agreement, dated as of April 9, 2018, between ACGL and Marc Grandisson†	8-K/A	10.1	April 11, 2018	
10.15	Employment Agreement, dated as of November 13, 2018, between Arch Capital Services Inc. and Louis Petrillo†	10-K	10.16	February 28, 2019	
10.16	Employment Agreement dated as of October 1,2019 between Arch Capital Group Ltd. and David Gansberg †	10-K			X
10.17	Arch U.S. Executive Supplemental Non-Qualified Savings and Retirement Plan†	10-K	10.24	March 2, 2009	
10.18	Third Amended and Restated Credit Agreement, dated as of December 17,2019, by and among ACGL, certain of its subsidiaries as subsidiary borrowers, Bank of America, N.A., as Administrative Agent, Fronting Bank and L/C Administrator, and the lenders party thereto	8-K	10.1	December 18, 2019	
21	Subsidiaries of Registrant				X
23	Consent of PricewaterhouseCoopers LLP				X
24	Power of Attorney				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	The following financial information from ACGL's Annual Report on Form 10-K for the year ended December 31, 2019 formatted in XBRL: (i) Consolidated Balance Sheets at December 31, 2019 and 2018; (ii) Consolidated Statements of Income for the years ended December 31, 2019, 2018 and 2017; (iii) Consolidated Statements of Comprehensive Income for the years ended December 31, 2019, 2018 and 2017; (iv) Consolidated Statements of Changes in Shareholders' Equity for the years ended December 31, 2019, 2018 and 2017; (v) Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017; and (vi) Notes to Consolidated Financial Statements				X

† Management contract or compensatory plan or arrangement.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) 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)

By: /s/ Marc Grandisson
Name: Marc Grandisson
Title: President and Chief Executive Officer (Principal Executive Officer)

February 28, 2020

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Name	Title	Date
/s/ Marc Grandisson Marc Grandisson	President and Chief Executive Officer (Principal Executive Officer)	February 28, 2020
/s/ François Morin François Morin	Executive Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 28, 2020
* John M. Pasquesi	Chairman of the Board	February 28, 2020
* John L. Bunce. Jr.	Director	February 28, 2020
* Eric W. Doppstadt	Director	February 28, 2020
* Laurie S. Goodman	Director	February 28, 2020

Name	Title	Date
* Moira Kilcoyne	Director	February 28, 2020
* Louis J. Paglia	Director	February 28, 2020
* Brian S. Posner	Director	February 28, 2020
* Eugene S. Sunshine	Director	February 28, 2020
* John D. Vollaro	Director	February 28, 2020
* Thomas R. Watjen	Director	February 28, 2020

* By François Morin, as attorney-in-fact and agent, pursuant to a power of attorney, a copy of which has been filed with the Securities and Exchange Commission as Exhibit 24 to this report.

/s/ François Morin

Name: François Morin
Attorney-in-Fact

SCHEDULE III

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
SUPPLEMENTARY INSURANCE INFORMATION
(U.S. dollars in thousands)

	Deferred Acquisition Costs	Reserves for Losses and Loss Adjustment Expenses	Unearned Premiums	Net Premiums Earned	Net Investment Income (1)	Net Losses and Loss Adjustment Expenses Incurred	Amortization of Deferred Acquisition Costs	Other Operating Expenses (2)	Net Premiums Written
December 31, 2019									
Insurance	$188,684	$7,900,328	$1,991,496	$2,397,080	NM	$1,615,475	$361,614	$454,770	$2,641,726
Reinsurance	197,856	4,270,013	971,776	1,466,389	NM	1,011,329	239,032	141,484	1,602,723
Mortgage	182,816	457,872	937,370	1,366,340	NM	53,513	134,319	153,092	1,261,756
Other	64,044	1,263,629	438,907	556,689	NM	453,135	105,980	51,651	532,862
Total	$633,400	$13,891,842	$4,339,549	$5,786,498	NM	$3,133,452	$840,945	$800,997	$6,039,067
December 31, 2018									
Insurance	$152,360	$7,093,018	$1,549,183	$2,205,661	NM	$1,520,680	$349,702	$364,138	$2,212,125
Reinsurance	166,276	3,215,909	710,774	1,261,216	NM	846,882	211,280	133,350	1,372,572
Mortgage	170,080	511,610	1,103,565	1,186,236	NM	81,289	118,595	142,432	1,157,875
Other	80,858	1,032,760	390,114	578,862	NM	441,255	125,558	37,889	604,175
Total	$569,574	$11,853,297	$3,753,636	$5,231,975	NM	$2,890,106	$805,135	$677,809	$5,346,747
December 31, 2017									
Insurance	$159,224	$6,952,676	$1,451,390	$2,113,018	NM	$1,622,444	$323,639	$359,524	$2,122,440
Reinsurance	150,582	3,053,694	633,810	1,142,621	NM	773,923	221,250	146,663	1,174,474
Mortgage	140,057	579,160	1,206,470	1,057,166	NM	134,677	100,598	146,336	1,111,342
Other	85,961	798,262	330,644	531,727	NM	436,402	129,971	31,928	553,117
Total	$535,824	$11,383,792	$3,622,314	$4,844,532	NM	$2,967,446	$775,458	$684,451	$4,961,373

(1) The Company does not manage its assets by segment and, accordingly, net investment income is not allocated to each underwriting segment. See note 4, “Segment Information,” to our consolidated financial statements in Item 8 for information related to the ‘other’ segment.

(2) Certain other operating expenses relate to the Company’s corporate segment (non-underwriting). Such amounts are not reflected in the table above. See note 4, “Segment Information,” to our consolidated financial statements in Item 8 for information related to the corporate segment.

SCHEDULE IV

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
REINSURANCE
(U.S. dollars in thousands)

	Gross Amount	Ceded to Other Companies (1)	Assumed From Other Companies (1)	Net Amount	Percentage of Amount Assumed to Net
Year Ended December 31, 2019					
Premiums Written:					
Insurance	$ 3,879,752	$ (1,266,267)	$ 28,241	$ 2,641,726	1.1%
Reinsurance	238,229	(720,500)	2,084,994	1,602,723	130.1%
Mortgage	1,224,373	(204,509)	241,892	1,261,756	19.2%
Other	339,169	(222,019)	415,712	532,862	78.0%
Total	$ 5,681,523	$ (2,099,893)	$ 2,457,437	$ 6,039,067	40.7%
Year Ended December 31, 2018					
Premiums Written:					
Insurance	$ 3,232,234	$ (1,050,207)	$ 30,098	$ 2,212,125	1.4%
Reinsurance	213,809	(539,950)	1,698,713	1,372,572	123.8%
Mortgage	1,139,099	(202,833)	221,609	1,157,875	19.1%
Other	253,760	(130,840)	481,255	604,175	79.7%
Total	$ 4,838,902	$ (1,614,257)	$ 2,122,102	$ 5,346,747	39.7%
Year Ended December 31, 2017					
Premiums Written:					
Insurance	$ 3,050,876	$ (958,646)	$ 30,210	$ 2,122,440	1.4%
Reinsurance	152,404	(465,925)	1,487,995	1,174,474	126.7%
Mortgage	1,110,319	(256,796)	257,819	1,111,342	23.2%
Other	133,858	(47,187)	466,446	553,117	84.3%
Total	$ 4,447,457	$ (1,407,052)	$ 1,920,968	$ 4,961,373	38.7%

(1) Certain amounts included in the gross premiums written of each segment are related to intersegment transactions and are included in the gross premiums written of each segment. 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.

SCHEDULE VI

ARCH CAPITAL GROUP LTD. AND SUBSIDIARIES
SUPPLEMENTARY INFORMATION FOR PROPERTY AND CASUALTY INSURANCE UNDERWRITERS
(U.S. dollars in thousands)

Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H		Column I	Column J	Column K
							Net Losses and Loss Adjustment Expenses Incurred Related to				
Affiliation with Registrant	Deferred Acquisition Costs	Reserves for Losses and Loss Adjustment Expenses	Discount, if any, deducted in Column C	Unearned Premiums	Net Premiums Earned	Net Investment Income	(a) Current Year	(b) Prior Years	Amortization of Deferred Acquisition Costs	Net Paid Losses and Loss Adjustment Expenses	Net Premiums Written
Consolidated Subsidiaries											
2019	$ 633,400	$ 13,891,842	$ 22,012	$ 4,339,549	$ 5,786,498	$ 627,738	$ 3,297,037	$ (163,585)	$ 840,945	$ 2,383,255	$ 6,039,067
2018	569,574	11,853,297	21,145	3,753,636	5,231,975	563,633	3,162,818	(272,712)	805,135	2,206,164	5,346,747
2017	535,824	11,383,792	20,016	3,622,314	4,844,532	470,872	3,205,428	(237,982)	775,458	2,352,912	4,961,373

ITEM 16. FORM 10-K SUMMARY

Not applicable.