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

For the fiscal year ended December 31, 2019

OR

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

For the Transition Period from to

Commission File No. 1-11778

CHUBB LIMITED

(Exact name of registrant as specified in its charter)

Switzerland	**98-0091805**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

Baerengasse 32
Zurich, Switzerland CH-8001
(Address of principal executive offices) (Zip Code)
+41 (0)43 456 76 00
(Registrant's telephone number, including area code)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Shares, par value CHF 24.15 per share	CB	New York Stock Exchange
Guarantee of Chubb INA Holdings Inc. 0.30% Senior Notes due 2024	CB/24A	New York Stock Exchange
Guarantee of Chubb INA Holdings Inc. 0.875% Senior Notes due 2027	CB/27	New York Stock Exchange
Guarantee of Chubb INA Holdings Inc. 1.55% Senior Notes due 2028	CB/28	New York Stock Exchange
Guarantee of Chubb INA Holdings Inc. 0.875% Senior Notes due 2029	CB/29A	New York Stock Exchange
Guarantee of Chubb INA Holdings Inc. 1.40% Senior Notes due 2031	CB/31	New York Stock Exchange
Guarantee of Chubb INA Holdings Inc. 2.50% Senior Notes due 2038	CB/38A	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the 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 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 Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☑ No ☐

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

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

Large accelerated filer	☑	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

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

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

The aggregate market value of voting stock held by non-affiliates as of June 28, 2019 (the last business day of the registrant's most recently completed second fiscal quarter), was approximately $67 billion. For the purposes of this computation, shares held by directors and officers of the registrant have been excluded. Such exclusion is not intended, nor shall it be deemed, to be an admission that such persons are affiliates of the registrant.

As of February 13, 2020 there were 451,907,796 Common Shares par value CHF 24.15 of the registrant outstanding.

Documents Incorporated by Reference

Certain portions of the registrant's definitive proxy statement relating to its 2020 Annual General Meeting of Shareholders are incorporated by reference into Part III of this report.

CHUBB LIMITED INDEX TO 10-K

PART I

ITEM 1. Business

General

Chubb Limited is the Swiss-incorporated holding company of the Chubb Group of Companies. Chubb Limited, which is headquartered in Zurich, Switzerland, and its direct and indirect subsidiaries (collectively, the Chubb Group of Companies, Chubb, we, us, or our) are a global insurance and reinsurance organization, serving the needs of a diverse group of clients worldwide. At December 31, 2019, we had total assets of $177 billion and shareholders' equity of $55 billion. Chubb was incorporated in 1985 at which time it opened its first business office in Bermuda and continues to maintain operations in Bermuda. We have grown our business through increased premium volume, expansion of product offerings and geographic reach, and the acquisition of other companies to become a global property and casualty (P&C) leader.

With operations in 54 countries and territories, Chubb provides commercial and personal property and casualty insurance, personal accident and supplemental health insurance (A&H), reinsurance, and life insurance to a diverse group of clients. We offer commercial insurance products and service offerings such as risk management programs, loss control, and engineering and complex claims management. We provide specialized insurance products ranging from Directors & Officers (D&O) and professional liability to various specialty-casualty and umbrella and excess casualty lines to niche areas such as aviation and energy. We also offer personal lines insurance coverage including homeowners, automobile, valuables, umbrella liability, and recreational marine products. In addition, we supply personal accident, supplemental health, and life insurance to individuals in select countries.

We serve multinational corporations, mid-size and small businesses with property and casualty insurance and risk engineering services; affluent and high net worth individuals with substantial assets to protect; individuals purchasing life, personal accident, supplemental health, homeowners, automobile, and specialty personal insurance coverage; companies and affinity groups providing or offering accident and health insurance programs and life insurance to their employees or members; and insurers managing exposures with reinsurance coverage.

At December 31, 2019, we employed approximately 33,000 people. We believe that employee relations are satisfactory.

We make available free of charge through our website (investors.chubb.com, under Financials) our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports, if any, filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after they have been electronically filed with or furnished to the U.S. Securities and Exchange Commission (SEC). Also available through our website (under Investor Relations / Corporate Governance) are our Corporate Governance Guidelines, Code of Conduct, and Charters for the Committees of the Board of Directors (the Board). Printed documents are available by contacting our Investor Relations Department (Telephone: +1 (212) 827-4445, E-mail: investorrelations@chubb.com).

We also use our website as a means of disclosing material, non-public information and for complying with our disclosure obligations under SEC Regulation FD (Fair Disclosure). Accordingly, investors should monitor the Investor Relations portion of our website, in addition to following our press releases, SEC filings, and public conference calls and webcasts. The information contained on, or that may be accessed through, our website is not incorporated by reference into, and is not a part of, this report. The SEC maintains an Internet site (www.sec.gov) that contains reports, proxy and information statements, and other information regarding issuers that file with the SEC.

Customers

For most commercial and personal lines of business we offer, insureds typically use the services of an insurance broker or agent. An insurance broker acts as an agent for the insureds, offering advice on the types and amount of insurance to purchase, and assists in the negotiation of price and terms and conditions. We obtain business from the local and major international insurance brokers and typically pay a commission to brokers for any business accepted and bound. Loss of all or a substantial portion of the business provided by one or more of these brokers could have a material adverse effect on our business. In our opinion, no material part of our business is dependent upon a single insured or group of insureds. We do not believe that the loss of any one insured would have a material adverse effect on our financial condition or results of operations, and no one insured or group of affiliated insureds account for as much as 10 percent of our total revenues.

Competition
Competition in the insurance and reinsurance marketplace is substantial. We compete on an international and regional basis with major U.S., Bermuda, European, and other international insurers and reinsurers and with underwriting syndicates, some of which have greater financial, technological, marketing, distribution and management resources than we do. In addition, capital market participants have created alternative products that are intended to compete with reinsurance products. We also compete with new companies and existing companies that move into the insurance and reinsurance markets. Competitors include other stock companies, mutual companies, alternative risk sharing groups (such as group captives and catastrophe pools), and other underwriting organizations. Competitors sell through various distribution channels and business models, across a broad array of product lines, and with a high level of variation regarding geographic, marketing, and customer segmentation. We compete for business not only on the basis of price but also on the basis of availability of coverage desired by customers and quality of service.

The insurance industry is changing rapidly. Our ability to compete is dependent on a number of factors, particularly our ability to maintain the appropriate financial strength ratings as assigned by independent rating agencies and effectively utilize new technology in our business. Our broad market capabilities in personal, commercial, specialty, and A&H lines made available by our underwriting expertise, business infrastructure, and global presence, help define our competitive advantage. Our strong balance sheet is attractive to businesses, and our strong capital position and global platform affords us opportunities for growth not available to smaller, less diversified insurance companies. Refer to “Segment Information” for competitive environment by segment.

Trademarks and Trade Names
Various trademarks and trade names we use protect names of certain products and services we offer and are important to the extent they provide goodwill and name recognition in the insurance industry. We use commercially reasonable efforts to protect these proprietary rights, including various trade secret and trademark laws. We intend to retain material trademark rights in perpetuity, so long as it satisfies the use and registration requirements of applicable countries. One or more of the trademarks and trade names could be material to our ability to sell our products and services. We have taken appropriate steps to protect our ownership of key names, and we believe it is unlikely that anyone would be able to prevent us from using names in places or circumstances material to our operations.

Segment Information
Chubb operates through six business segments: North America Commercial P&C Insurance, North America Personal P&C Insurance, North America Agricultural Insurance, Overseas General Insurance, Global Reinsurance, and Life Insurance.

In 2019, consolidated net premiums earned was $31,290 million. Additional financial information about our segments, including net premiums earned by geographic region, is included in Note 15 to the Consolidated Financial Statements.

North America Commercial P&C Insurance (41 percent of 2019 Consolidated NPE)

Overview
The North America Commercial P&C Insurance segment comprises operations that provide P&C insurance and services to large, middle market, and small commercial businesses in the U.S., Canada, and Bermuda. This segment includes:

- Major Accounts, the retail division focused on large institutional organizations and corporate companies
- Commercial Insurance, which includes the retail division focused on middle market customers and small businesses
- Westchester and Chubb Bermuda, our wholesale and specialty divisions

Products and Distribution
Major Accounts provides a broad array of traditional and specialty P&C, A&H, and risk management products and services to large U.S. and Canadian-based institutional organizations and corporate companies. Major Accounts distributes its insurance products primarily through a limited number of retail brokers. In addition to using brokers, certain products are also distributed through general agents, independent agents, managing general agents (MGA), managing general underwriters, alliances, affinity groups, and direct marketing operations. Products and services offered include property, professional liability, cyber risk, excess casualty, workers’ compensation, general liability, automobile liability, commercial marine, surety, environmental, construction, medical risk, inland marine, A&H coverages, as well as claims and risk management products and services.

The Major Accounts operations, which represented approximately 40 percent of North America Commercial P&C Insurance's net premiums earned in 2019, are organized into the following distinct business units, each offering specialized products and services targeted at specific markets:

- Chubb Global Casualty offers a range of customized risk management primary casualty products designed to help large insureds, including national accounts, address the significant costs of financing and managing risk for workers' compensation, general liability and automobile liability coverages as well as offering casualty insurance solutions for commercial real estate. Chubb Global Casualty also provides products which insure specific global operating risks of U.S.-based multinational companies and include deductible programs, captive programs, and paid or incurred loss retrospective plans. Within Chubb Global Casualty, Chubb Alternative Risk Solutions Group underwrites contractual indemnification policies which provides prospective coverage for loss events within the insured's policy retention levels and underwrites assumed loss portfolio transfer (LPT) contracts in which insured loss events have occurred prior to the inception of the contract.
- Property provides products and services including primary, quota share and excess all-risk insurance, risk management programs and services, commercial, inland marine, and aerospace products.
- Casualty Risk provides coverages including umbrella and excess liability, environmental risk, casualty programs for commercial construction related projects for companies and institutions, and medical risk specialty liability products for the healthcare industry.
- Surety offers a wide variety of surety products and specializes in underwriting both commercial and contract bonds and has the capacity for bond issuance on an international basis.
- Accident & Health (A&H) products include employee benefit plans, occupational accident, student accident, and worldwide travel accident and global medical programs. With respect to products that include supplemental medical and hospital indemnity coverages, we typically pay fixed amounts for claims and are therefore insulated from rising healthcare costs. A&H also provides specialty personal lines products, including credit card enhancement programs (identity theft, rental car collision damage waiver, trip travel, and purchase protection benefits) distributed through affinity groups.
- Financial Lines provides management liability and professional liability (D&O and E&O), transactional risk and cyber risk products to public companies as well as to private and not for profit organizations.
- ESIS Inc. (ESIS) is an in-house third-party claims administrator that performs claims management and risk control services for domestic and international organizations as well as for the North America Commercial P&C Insurance segment. ESIS services include comprehensive medical managed care; integrated disability services; pre-loss control and risk management; health, safety and environmental consulting; salvage and subrogation; and healthcare recovery services. The net results for ESIS are included in North America Commercial P&C Insurance's administrative expenses.

The Commercial Insurance operations, which include Small Commercial, represented approximately 40 percent of North America Commercial P&C Insurance's net premiums earned in 2019. Commercial Insurance provides a broad range of P&C, financial lines, and A&H products targeted to U.S and Canadian-based middle market customers in a variety of industries, while the Small Commercial operations provide a broad range of property and casualty, workers' compensation, small commercial management and professional liability for small businesses based in the U.S.

- Commercial Insurance products and services offered include traditional property and casualty lines of business, including Package, which combines property and general liability, workers' compensation, automobile, umbrella; financial lines of business, including professional liability, management liability and cyber risk coverage; and other lines including environmental, A&H, and international coverages. Commercial Insurance distributes its insurance products through a North American network of independent retail agents, and regional, multinational and digital brokers. Generally, our customers purchase insurance through a single retail agent or broker, do not employ a risk management department, and do not retain significant risk through self-insured retentions. The majority of our customers purchase a Package product or a portfolio of products, which is a collection of insurance offerings designed to cover various needs.
- Small Commercial Insurance products and services offered include property and casualty lines of business, including a business owner policy which contains property and general liability; financial lines, including professional liability, management liability, cyber risk; and other lines including workers' compensation, automobile liability, and international coverages. Products are generally offered through a North American network of independent agents and brokers, as well as eTraditional, which are digital platforms where we electronically quote, bind, and issue for agents and brokers. An example of this is the Chubb Marketplace.

Wholesale and Specialty, which represented approximately 20 percent of North America Commercial P&C Insurance's net premiums earned in 2019, comprises Westchester and Chubb Bermuda.

- Westchester serves the market for business risks that tend to be hard to place or not easily covered by traditional policies due to unique or complex exposures and provides specialty products for property, casualty, environmental, professional liability, inland marine, product recall, small business, binding and program coverages in the U.S., Canada, and Bermuda. Products are offered through the wholesale distribution channel.
- Chubb Bermuda provides commercial insurance products on an excess basis including excess liability, D&O, professional liability, property, and political risk, the latter being written by Sovereign Risk Insurance Ltd., a wholly-owned managing agent. Chubb Bermuda focuses on Fortune 1000 companies and targets risks that are generally low in frequency and high in severity. Products are offered primarily through the Bermuda offices of major, internationally recognized insurance brokers.

Competitive Environment
Major Accounts competes against a number of large, global carriers as well as regional competitors and other entities offering risk alternatives such as self-insured retentions and captive programs. The markets in which we compete are subject to significant cycles of fluctuating capacity and wide disparities in price adequacy. We pursue a specialist strategy and focus on market opportunities where we can compete effectively based on service levels and product design, while still achieving an adequate level of profitability. We also achieve a competitive advantage through Major Accounts' innovative product offerings and our ability to provide multiple products to a single client due to our nationwide local presence. In addition, all our domestic commercial units are able to deliver global products and coverage to customers in concert with our Overseas General Insurance segment.

The Commercial Insurance operations compete against numerous insurance companies ranging from large national carriers to small and mid-size insurers who provide specialty coverages and standard P&C products. Recent competitive developments include the growth of new digital-based distribution models.

Westchester competes against a number of large, national carriers as well as regional competitors and other entities offering risk alternatives such as self-insured retentions and captive programs. Chubb Bermuda competes against international commercial carriers writing business on an excess of loss basis.

North America Personal P&C Insurance (15 percent of 2019 Consolidated NPE)

Overview
The North America Personal P&C Insurance segment includes the business written by Chubb Personal Risk Services division, which includes high net worth personal lines business, with operations in the U.S. and Canada. This segment provides affluent and high net worth individuals and families with homeowners, automobile and collector cars, valuable articles (including fine arts), personal and excess liability, travel insurance, and recreational marine insurance and services. Our homeowners business, including valuable articles, represented 68 percent of North America Personal P&C Insurance's net premiums earned in 2019.

Products and Distribution
Chubb Personal Risk Services offers comprehensive personal insurance products and services to meet the evolving needs of high net worth families and individuals. Our seamless customer experience and superior coverage protect not only our clients' most valuable possessions, but also their standard of living. Our target customers consist of high net worth consumers with insurance needs that typically extend beyond what mass market carriers can offer. These coverages are offered solely through independent regional agents and brokers.

Competitive Environment
Chubb Personal Risk Services competes against insurance companies of varying sizes that sell personal lines products through various distribution channels, including retail agents as well as online distribution channels. We achieve a competitive advantage through our ability to address the specific needs of high net worth families and individuals, to provide superior service to our customers, and to develop and deploy digital production and processes.

North America Agricultural Insurance (6 percent of 2019 Consolidated NPE)

Overview
The North America Agricultural Insurance segment comprises our U.S. and Canadian-based businesses that provide a variety of coverages including crop insurance, primarily Multiple Peril Crop Insurance (MPCI) and crop-hail insurance through Rain and Hail Insurance Service, Inc. (Rain and Hail) as well as farm and ranch and specialty P&C commercial insurance products and services through our Chubb Agribusiness unit.

Products and Distribution
Rain and Hail provides comprehensive MPCI and crop-hail insurance coverages.

- MPCI is federally subsidized crop protection from numerous causes of loss, including drought, excessive moisture, freeze, disease and more. The MPCI program is offered in conjunction with the U.S. Department of Agriculture. MPCI products include revenue protection (defined as providing both commodity price and yield coverages), yield protection, margin protection, prevented planting coverage and replant coverage. For additional information on our MPCI program, refer to “Crop Insurance” under Item 7.
- Crop-Hail coverage provides crop protection from damage caused by hail and/or fire, with options in some markets for other perils such as wind or theft. Coverage is provided on an acre-by-acre basis and is available in the U.S. and in some parts of Canada. Crop-Hail can be used in conjunction with MPCI or other comprehensive coverages to offset the deductible and provide protection up to the actual cash value of the crop.

Chubb Agribusiness comprises Commercial Agribusiness and Farm and Ranch Agribusiness.

- Commercial Agribusiness offers specialty P&C coverages for commercial companies that manufacture, process and distribute agricultural products. Commercial products and services include property, general liability for premises/operations and product liability, commercial automobile, workers' compensation, employment practices liability coverage, built-in coverage for premises pollution, cyber and information security, and product withdrawal.
- Farm and Ranch Agribusiness offers an extensive line of coverages for farming operations from Hobby/Gentleman farms to complex corporate farms and equine services including personal use, boarding, and training. Coverages include farm and ranch structures, machinery and other equipment, automobile and other vehicle coverages, and livestock.

Competitive Environment
Rain and Hail primarily operates in a federally regulated program where all approved providers offer the same product forms and rates through independent and/or captive agents. We seek a competitive advantage through our ability to provide superior service to our customers, including the development of digital solutions. Chubb Agribusiness competes against both national and regional competitors offering specialty P&C insurance coverages to companies that manufacture, process, and distribute agricultural products.

Overseas General Insurance (28 percent of 2019 Consolidated NPE)

Overview
The Overseas General Insurance segment comprises Chubb International and Chubb Global Markets (CGM). CGM, our London-based international specialty and excess and surplus lines business, includes Lloyd's of London (Lloyd's) Syndicate 2488, a wholly-owned Chubb syndicate supported by funds at Lloyd’s provided by Chubb Corporate Members. Syndicate 2488 has an underwriting capacity of £480 million for the Lloyd’s 2020 account year. The syndicate is managed by Chubb’s Lloyd’s managing agency, Chubb Underwriting Agencies Limited.

Products and Distribution
Chubb International maintains a presence in every major insurance market in the world and is organized geographically along product lines as follows: Europe, Asia Pacific and Far East, Eurasia and Africa, and Latin America. Products offered include P&C, A&H, specialty coverages, and personal lines insurance products and services. Chubb International's P&C business is generally written, on both a direct and assumed basis, through major international, regional, and local brokers and agents. Certain European branded products are also offered via an eTraditional digital-commerce platform, Chubb Online, that allows brokers to quote, bind, and issue specialty policies online. Asia Pacific also utilizes similar eTraditional platforms to quote, bind,

and issue policies. Property insurance products include traditional commercial fire coverage as well as energy industry-related, marine, construction, and other technical coverages. Principal casualty products are commercial primary and excess casualty, environmental, and general liability. A&H and other consumer lines products are distributed through brokers, agents, direct marketing programs, including thousands of telemarketers, and sponsor relationships. The A&H operations primarily offer personal accident and supplemental medical coverages including accidental death, business/holiday travel, specified disease, disability, medical and hospital indemnity, and income protection. We are not in the primary healthcare business. With respect to our supplemental medical and hospital indemnity products, we typically pay fixed amounts for claims and are therefore largely insulated from the direct impact of rising healthcare costs. Chubb International specialty coverages include D&O, professional indemnity, energy, aviation, political risk, and specialty personal lines products. Chubb International's personal lines operations provide specialty products and services designed to meet the needs of specific target markets and include property damage, automobile, homeowners, and personal liability.

Chubb International’s presence in China also includes its 30.9 percent ownership interest in Huatai Insurance Group Company Limited (Huatai Group). Huatai Group wholly owns Huatai Property & Casualty Insurance Co., Ltd. (Huatai P&C). Therefore, Chubb owns an approximately 30.9 percent indirect ownership interest in Huatai P&C, which provides a range of commercial and personal P&C products in China, including property, professional liability, product liability, employer liability, business interruption, marine cargo, personal accident and specialty risk. These products are marketed through a variety of distribution channels including over 200 licensed sales locations in 28 Chinese provinces. Chubb is in the process of increasing its ownership interest in Huatai Group.

CGM offers products through its parallel distribution network via two legal entities, Chubb European Group SE (CEG) and Chubb Underwriting Agencies Limited, managing agent of Syndicate 2488. CGM uses the Syndicate to underwrite P&C business on a global basis through Lloyd's worldwide licenses. CGM uses CEG to underwrite similar classes of business through its network of U.K. and European licenses, and in the U.S. where it is eligible to write excess and surplus lines business. Factors influencing the decision to place business with the Syndicate or CEG include licensing eligibilities, capitalization requirements, and client/broker preference. All business underwritten by CGM is accessed through registered brokers. The main lines of business include aviation, property, energy, professional lines, marine, financial lines, political risk, and A&H.

Competitive Environment

Chubb International's primary competitors include U.S.-based companies with global operations, as well as non-U.S. global carriers and indigenous companies in regional and local markets. For the A&H lines of business, locally based competitors also include financial institutions and bank owned insurance subsidiaries. Our international operations have the distinct advantage of being part of one of the few international insurance groups with a global network of licensed companies able to write policies on a locally admitted basis. The principal competitive factors that affect the international operations are underwriting expertise and pricing, relative operating efficiency, product differentiation, producer relations, and the quality of policyholder services. A competitive strength of our international operations is our global network and breadth of insurance programs, which assist individuals and business organizations to meet their risk management objectives, while also having a significant presence in all of the countries in which we operate, giving us the advantage of accessing local technical expertise and regulatory environments, understanding local markets and culture, accomplishing a spread of risk, and offering a global network to service multinational accounts.

CGM is one of the preeminent international specialty insurers in London and is an established lead underwriter on a significant portion of the risks it underwrites for all lines of business. All lines of business face competition, depending on the business class, from Lloyd's syndicates, the London market, and other major international insurers and reinsurers. Competition for international risks is also seen from domestic insurers in the country of origin of the insured. CGM differentiates itself from competitors through long standing experience in its product lines, its multiple insurance entities (Syndicate 2488 and CEG), and the quality of its underwriting and claims service.

Global Reinsurance (2 percent of 2019 Consolidated NPE)

Overview

The Global Reinsurance segment represents Chubb's reinsurance operations comprising Chubb Tempest Re Bermuda, Chubb Tempest Re USA, Chubb Tempest Re International, and Chubb Tempest Re Canada. Global Reinsurance markets reinsurance products worldwide under the Chubb Tempest Re brand name and provides solutions for small to mid-sized clients and multinational ceding companies. Global Re offers a broad array of traditional and non-traditional (e.g., loss portfolio transfer) property and casualty products.

Products and Distribution
Global Reinsurance services clients globally through its major units. Major international brokers submit business to one or more of these units' underwriting teams who have built strong relationships with both key brokers and clients by providing a responsive, client-focused approach to risk assessment and pricing.

Chubb Tempest Re Bermuda principally provides property catastrophe reinsurance globally to insurers of commercial and personal property. Property catastrophe reinsurance is on an occurrence or aggregate basis and protects a ceding company against an accumulation of losses covered by its issued insurance policies, arising from a common event or occurrence. Chubb Tempest Re Bermuda underwrites reinsurance principally on an excess of loss basis, meaning that its exposure only arises after the ceding company's accumulated losses have exceeded the attachment point of the reinsurance policy. Chubb Tempest Re Bermuda also writes other types of reinsurance on a limited basis for selected clients. Chubb Tempest Re Bermuda's business is produced through reinsurance intermediaries.

Chubb Tempest Re USA writes all lines of traditional and specialty P&C reinsurance for the North American market, principally on a treaty basis, with a focus on writing property per risk and casualty reinsurance. Chubb Tempest Re USA underwrites reinsurance on both a proportional and excess of loss basis. This unit's diversified portfolio is produced through reinsurance intermediaries.

Chubb Tempest Re International provides traditional and specialty P&C reinsurance to insurance companies worldwide, with emphasis on non-U.S. and Canadian risks. Chubb Tempest Re International writes all lines of traditional and specialty reinsurance including property risk, property catastrophe, casualty, marine, aviation, and specialty through our London- and Zurich-based offices. The London-based office of Chubb Tempest Re International focuses on the development of business sourced through London market brokers. The Zurich-based office focuses on providing reinsurance to continental European insurers via continental European brokers while also serving Asian and Latin American markets. The London- and Zurich-based offices write a diverse book of international business using Syndicate 2488, CEG, and Chubb Insurance (Switzerland) Limited. Chubb Tempest Re International underwrites reinsurance on both a proportional and excess of loss basis.

Chubb Tempest Re Canada offers a full array of traditional and specialty P&C, and reinsurance to the Canadian market, including casualty, property risk, property catastrophe, surety, and crop hail. Chubb Tempest Re Canada provides coverage through its Canadian company platform and also offers clients access to Syndicate 2488. Chubb Tempest Re Canada underwrites reinsurance on both a proportional and excess of loss basis.

Competitive Environment
The Global Reinsurance segment competes worldwide with major U.S. and non-U.S. reinsurers as well as reinsurance departments of numerous multi-line insurance organizations. In addition, capital markets participants have developed alternative capital sources intended to compete with traditional reinsurance. Additionally, government sponsored or backed catastrophe funds can affect demand for reinsurance. Global Reinsurance is considered a lead reinsurer and is typically involved in the negotiation and quotation of the terms and conditions of the majority of the contracts in which it participates. Global Reinsurance competes effectively in P&C markets worldwide because of its strong capital position, analytical capabilities and quality customer service. The key competitors in our markets vary by geographic region and product line. An advantage of our international platform is that we can change our mix of business in response to changes in competitive conditions in the territories in which we operate. Our geographic reach is also sought by multinational ceding companies since our offices, except for Bermuda, provide local reinsurance license capabilities which benefit our clients in dealing with country regulators.

Life Insurance (8 percent of 2019 Consolidated NPE)

Overview
The Life Insurance segment comprises Chubb's international life operations (Chubb Life), Chubb Tempest Life Re (Chubb Life Re), and the North American supplemental A&H and life business of Combined Insurance.

Products and Distribution
Chubb Life provides individual life and group benefit insurance primarily in Asia, including Hong Kong, Indonesia, South Korea, Taiwan, Thailand, and Vietnam; throughout Latin America; selectively in Europe; Egypt; and in China through a non-consolidated joint venture insurance company. Chubb Life offers a broad portfolio of protection and savings products including whole life, endowment plans, individual term life, group term life, medical and health, personal accident, credit life, universal life, Group Employee benefits, unit linked contracts, and credit protection insurance for automobile, motorcycle and home loans.

The policies written by Chubb Life generally provide funds to beneficiaries of insureds after death and/or protection and/or savings benefits while the contract owner is living. Chubb Life sells to consumers through a variety of distribution channels including captive and independent agencies, bancassurance, worksite marketing, retailers, brokers, telemarketing, mobilassurance, and direct to consumer marketing. We continue to expand Chubb Life with a focus on opportunities in developing markets that we believe will result in strong and sustainable operating profits as well as a favorable return on capital commitments over time. Our dedicated captive agency distribution channel, whereby agents sell Chubb Life products exclusively, enables us to maintain direct contact with the individual consumer, promote quality sales practices, and exercise greater control over the future of the business. We have developed a substantial sales force of agents principally located in our Asia-Pacific countries. As of December 31, 2019, Chubb had a 45 percent direct and indirect ownership interest in Huatai Life Insurance Co., Ltd. (Huatai Life), comprising a 20 percent direct ownership interest as well as a 25 percent indirect ownership interest through Huatai Group, the parent company of Huatai Life. Huatai Life commenced operations in 2005 and has since grown to become one of the larger life insurance foreign joint ventures in China. Huatai Life offers a broad portfolio of insurance products including whole life, universal life, medical and health, personal accident and disability. These products are marketed through a variety of distribution channels including approximately 454 licensed sales locations in 20 Chinese provinces. Chubb is in the process of increasing its ownership interest in Huatai Group.

Chubb Life Re's core business is a Bermuda-based operation which provides reinsurance to primary life insurers, focusing on guarantees included in certain variable annuity products and also on more traditional mortality reinsurance protection. Chubb Life Re's U.S.-based traditional life reinsurance operation was discontinued for new business in January 2010. Since 2007, Chubb Life Re has not quoted on new opportunities in the variable annuity reinsurance marketplace and our focus has been on managing the current portfolio of risk, both in the aggregate and on a contract basis. This business is managed with a long-term perspective and short-term earnings volatility is expected.

Combined Insurance distributes specialty supplemental A&H and life insurance products targeted to middle income consumers and businesses in the U.S. and Canada. Combined Insurance's substantial North American sales force distributes a wide range of supplemental accident and sickness insurance products, including personal accident, short-term disability, critical illness, Medicare supplement products, and hospital confinement/recovery. Most of these products are primarily fixed-indemnity benefit obligations and are not directly subject to escalating medical cost inflation.

Competitive Environment
Chubb Life's competition differs by location but generally includes multinational insurers, and in some locations, local insurers, joint ventures, or state-owned insurers. Chubb's financial strength and reputation as an entrepreneurial organization with a global presence gives Chubb Life a strong base from which to compete. While Chubb Life Re is not currently quoting on new opportunities in the variable annuity reinsurance marketplace, we continue to monitor developments in this market. Combined Insurance competes for A&H business in the U.S. against numerous A&H and life insurance companies across various industry segments.

Corporate

Corporate results primarily include results of all run-off asbestos and environmental (A&E) exposures, the results of our run-off Brandywine business, the results of Westchester specialty operations for 1996 and prior years, certain other run-off exposures, and income and expenses not attributable to reportable segments and the results of our non-insurance companies. The run-off operations do not actively sell insurance products, but are responsible for the management of existing policies and settlement of related claims.

Our exposure to A&E claims principally arises out of liabilities acquired when we purchased Westchester Specialty in 1998, CIGNA's P&C business in 1999, and The Chubb Corporation in 2016. The A&E liabilities principally relate to claims arising from bodily-injury claims related to asbestos products and remediation costs associated with hazardous waste sites.

Underwriting

Chubb is an underwriting company and we strive to emphasize quality of underwriting rather than volume of business or market share. Our underwriting strategy is to manage risk by employing consistent, disciplined pricing and risk selection. This, coupled with writing a number of less cyclical product lines, has helped us develop flexibility and stability of our business, and has allowed us to maintain a profitable book of business throughout market cycles. Clearly defined underwriting authorities, standards, and guidelines coupled with a strong underwriting audit function are in place in each of our local operations and global profit centers. Global product boards ensure consistency of approach and the establishment of best practices throughout the world. Our priority is to help ensure adherence to criteria for risk selection by maintaining high levels of experience and expertise in our underwriting staff. In addition, we employ a business review structure that helps ensure control of risk quality and appropriate use of policy limits and terms and conditions. Underwriting discipline is at the heart of our operating philosophy.

Actuaries in each region work closely with the underwriting teams to provide additional expertise in the underwriting process. We use internal and external data together with sophisticated analytical, catastrophe loss and risk modeling techniques to ensure an appropriate understanding of risk, including diversification and correlation effects, across different product lines and territories. We recognize that climate changes and weather patterns are integral to our underwriting process and we continually adjust our process to address these changes. This is intended to help ensure that losses are contained within our risk tolerance and appetite for individual product lines, businesses, and Chubb as a whole. Our use of such tools and data also reflects an understanding of their inherent limitations and uncertainties.

We also purchase protection from third parties, including, but not limited to, reinsurance as a tool to diversify risk and limit the net loss potential of catastrophes and large or unusually hazardous risks. For additional information refer to "Risk Factors" under Item 1A, “Reinsurance Protection”, below, “Catastrophe Management” and “Natural Catastrophe Property Reinsurance Program”, under Item 7, and Note 5 to the Consolidated Financial Statements, under Item 8.

Reinsurance Protection

As part of our risk management strategy, we purchase reinsurance protection to mitigate our exposure to losses, including certain catastrophes, to a level consistent with our risk appetite. Although reinsurance agreements contractually obligate our reinsurers to reimburse us for an agreed-upon portion of our gross paid losses, reinsurance does not discharge our primary liability to our insureds and, thus, we ultimately remain liable for the gross direct losses. In certain countries, reinsurer selection is limited by local laws or regulations. In most countries there is more freedom of choice, and the counterparty is selected based upon its financial strength, claims settlement record, management, line of business expertise, and its price for assuming the risk transferred. In support of this process, we maintain a Chubb authorized reinsurer list that stratifies these authorized reinsurers by classes of business and acceptable limits. This list is maintained by our Reinsurance Security Committee (RSC), a committee comprising senior management personnel and a dedicated reinsurer security team. Changes to the list are authorized by the RSC and recommended to the Chair of the Risk and Underwriting Committee. The reinsurers on the authorized list and potential new markets are regularly reviewed and the list may be modified following these reviews. In addition to the authorized list, there is a formal exception process that allows authorized reinsurance buyers to use reinsurers already on the authorized list for higher limits or different lines of business, for example, or other reinsurers not on the authorized list if their use is supported by compelling business reasons for a particular reinsurance program.

A separate policy and process exists for captive reinsurance companies. Generally, these reinsurance companies are established by our clients or our clients have an interest in them. It is generally our policy to obtain collateral equal to the expected losses that may be ceded to the captive. Where appropriate, exceptions to the collateral requirement are granted but only after senior management review. Specific collateral guidelines and an exception process are in place for the North America Commercial P&C Insurance, North America Personal P&C Insurance, and Overseas General Insurance segments, all of which have credit management units evaluating the captive's credit quality and that of their parent company. The credit management units, working with actuaries, determine reasonable exposure estimates (collateral calculations), ensure receipt of collateral in an acceptable form, and coordinate collateral adjustments as and when needed. Financial reviews and expected loss evaluations are performed annually for active captive accounts and as needed for run-off exposures. In addition to collateral, parental guarantees are often used to enhance the credit quality of the captive.

In general, we seek to place our reinsurance with highly rated companies with which we have a strong trading relationship. For additional information refer to “Catastrophe Management” and “Natural Catastrophe Property Reinsurance Program” under Item 7, and Note 5 to the Consolidated Financial Statements, under Item 8.

Unpaid Losses and Loss Expenses

We establish reserves for unpaid losses and loss expenses, which are estimates of future payments on reported and unreported claims for losses and related expenses, with respect to insured events that have occurred. These reserves are recorded in Unpaid losses and loss expenses in the Consolidated balance sheets. The process of establishing loss and loss expense reserves for P&C claims can be complex and is subject to considerable uncertainty as it requires the use of informed estimates and judgments based on circumstances known at the date of accrual. These estimates and judgments are based on numerous factors, and may be revised as additional experience and other data become available and are reviewed, as new or improved methodologies are developed, or as laws change. Internal actuaries regularly analyze the levels of loss and loss expense reserves, taking into consideration factors that may impact the ultimate settlement value of the unpaid losses and loss expenses. These analyses could result in future changes in the estimates of loss and loss expense reserves or reinsurance recoverables and any such changes would be reflected in our results of operations in the period in which the estimates are changed. Losses and loss expenses are charged to income as incurred. The reserve for unpaid losses and loss expenses represents the estimated ultimate losses and loss expenses less paid losses and loss expenses, and comprises case reserves and incurred but not reported (IBNR) reserves. With the exception of certain structured settlements, for which the timing and amount of future claim payments are reliably determinable, and certain reserves for unsettled claims, our loss reserves are not discounted for the time value of money. In connection with such structured settlements and certain reserves for unsettled claims, we carried net discounted reserves of $74 million at December 31, 2019.

For each product line, management, after consultation with internal actuaries, develops a “best estimate” of the ultimate settlement value of the unpaid losses and loss expenses that it believes provides a reasonable estimate of the required reserve. We evaluate our estimates of reserves quarterly in light of developing information. While we are unable at this time to determine whether additional reserves may be necessary in the future, we believe that our reserves for unpaid losses and loss expenses are adequate at December 31, 2019. Future additions to reserves, if needed, could have a material adverse effect on our financial condition, results of operations, and cash flows. For additional information refer to “Critical Accounting Estimates – Unpaid losses and loss expenses”, under Item 7, and Note 7 to the Consolidated Financial Statements, under Item 8.

Investments

Our objective is to maximize investment income and total return while ensuring an appropriate level of liquidity, investment quality, and diversification. As such, Chubb's investment portfolio is invested primarily in investment-grade fixed-income securities as measured by the major rating agencies. We do not allow leverage in our investment portfolio.

The critical aspects of the investment process are controlled by Chubb Asset Management, an indirect wholly-owned subsidiary of Chubb. These aspects include asset allocation, portfolio and guideline design, risk management, and oversight of external asset managers. In this regard, Chubb Asset Management:

- conducts formal asset allocation modeling for each of the Chubb subsidiaries, providing formal recommendations for the portfolio's structure;
- establishes recommended investment guidelines that are appropriate to the prescribed asset allocation targets;
- provides the analysis, evaluation, and selection of our external investment advisors;
- establishes and develops investment-related analytics to enhance portfolio engineering and risk control;
- monitors and aggregates the correlated risk of the overall investment portfolio; and
- provides governance over the investment process for each of our operating companies to ensure consistency of approach and adherence to investment guidelines.

Under our guidance and direction, external asset managers conduct security and sector selection and transaction execution. Use of multiple managers benefits Chubb in several ways – it provides us with operational and cost efficiencies, diversity of styles and approaches, innovations in investment research and credit and risk management, all of which enhance the risk adjusted returns of our portfolios.

Chubb Asset Management determines the investment portfolio's allowable, targeted asset allocation and ranges for each of the segments. These asset allocation targets are derived from sophisticated asset and liability modeling that measures correlated histories of returns and volatility of returns. Allowable investment classes are further refined through analysis of our operating environment including expected volatility of cash flows, potential impact on our capital position, and regulatory and rating agency considerations.

The Board has established a Risk & Finance Committee which helps execute the Board's supervisory responsibilities pertaining to enterprise risk management including investment risk. Under the overall supervision of the Risk & Finance Committee, Chubb's governance over investment management is rigorous and ongoing. Among its responsibilities, the Risk & Finance Committee of the Board:

- reviews and approves asset allocation targets and investment policy to ensure that it is consistent with our overall goals, strategies, and objectives;
- reviews and approves investment guidelines to ensure that appropriate levels of portfolio liquidity, credit quality, diversification, and volatility are maintained; and
- systematically reviews the portfolio's exposures including any potential violations of investment guidelines.

We have long-standing global credit limits for our entire portfolio across the organization and for individual obligors. Exposures are aggregated, monitored, and actively managed by our Global Credit Committee, comprising senior executives, including our Chief Financial Officer, our Chief Risk Officer, our Chief Investment Officer, and our Treasurer.

Within the guidelines and asset allocation parameters established by the Risk & Finance Committee, individual investment committees of the segments determine tactical asset allocation. Additionally, these committees review all investment-related activity that affects their operating company, including the selection of outside investment advisors, proposed asset allocation changes, and the systematic review of investment guidelines.

For additional information regarding the investment portfolio, including breakdowns of the sector and maturity distributions, refer to Note 3 to the Consolidated Financial Statements under Item 8.

Regulation

Our insurance and reinsurance subsidiaries conduct business globally, including in all 50 states of the United States and the District of Columbia. Our business is subject to varying degrees of regulation and supervision in each of the jurisdictions in which our insurance and reinsurance subsidiaries are domiciled and on a group basis. The laws and regulations of the jurisdictions in which our insurance and reinsurance subsidiaries are domiciled require among other things that these subsidiaries maintain minimum levels of statutory capital, surplus, and liquidity, meet solvency standards, and submit to periodic examinations of their financial condition. The complex regulatory environments in which Chubb operates are subject to change and are regularly monitored.

Group Supervision

In 2012, the Pennsylvania Insurance Department (Department), in consultation with other insurance regulatory bodies that oversee Chubb's insurance activities, convened the first Chubb Supervisory College (College). Regulators from approximately ten jurisdictions attended the College in Philadelphia, Pennsylvania, during which the supervisors reviewed information on Chubb. The Department, in cooperation with the other supervisory college regulators, published a notice of its determination that it is the appropriate group-wide supervisor for Chubb.

Since 2012, the College has convened bi-annually in-person; and, in July 2017, the College convened its first interim College teleconference, with the most recent teleconference held in September 2019. During these meetings, the College reviewed extensive information about Chubb, without material adverse comment. The next in-person College is scheduled for September 2020 in Philadelphia, Pennsylvania.

The following is an overview of regulations for our operations in Switzerland, the U.S., Bermuda, and other international locations.

Swiss Operations

The Swiss Financial Market Supervisory Authority (FINMA) has the discretion to supervise Chubb on a group-wide basis. However, FINMA acknowledges the Department's assumption of group supervision over us.

In 2008, we formed Chubb Insurance (Switzerland) Limited which offers property and casualty insurance to Swiss companies, A&H insurance for individuals of Swiss Corporations as well as reinsurance predominantly in Continental Europe. We have also formed a reinsurance subsidiary named Chubb Reinsurance (Switzerland) Limited, which we operate as primarily a provider of reinsurance to Chubb entities. Both companies are licensed and governed by FINMA.

U.S. Operations
Our U.S. insurance subsidiaries are subject to extensive regulation and supervision by the states in which they do business. The laws of the various states establish departments of insurance with broad authority to regulate, among other things: the standards of solvency that must be met and maintained, the licensing of insurers and their producers, approval of policy forms and rates, the nature of and limitations on investments, restrictions on the size of the risks which may be insured under a single policy, deposits of securities for the benefit of policyholders, requirements for the acceptability of reinsurers, periodic examinations of the affairs of insurance companies, the form and content of reports of financial condition required to be filed, and the adequacy of reserves for unearned premiums, losses, and other exposures.

Our U.S. insurance subsidiaries are required to file detailed annual and quarterly reports with state insurance regulators. In addition, our U.S. insurance subsidiaries' operations and financial records are subject to examination at regular intervals by state regulators.

All states have enacted legislation that regulates insurance holding companies. This legislation provides that each insurance company in the insurance holding company system (system) is required to register with the insurance department of its state of domicile and furnish information concerning the operations of companies within the system that may materially affect the operations, management, or financial condition of the insurers within the system. We are required to file an annual enterprise risk report with the Department, identifying the material risks within our system that could pose enterprise risk to the insurance subsidiaries in the system. All transactions within a system must be fair and equitable. Notice to the insurance departments is required prior to the consummation of transactions affecting the ownership or control of an insurer and of certain material transactions between an insurer and an entity in its system. In addition, certain transactions may not be consummated without the department's prior approval.

We are also required to file an annual report with the Department, reflecting our internal assessment of material risks associated with our current business plan and the sufficiency of our capital resources to support those risks.

Statutory surplus is an important measure used by the regulators and rating agencies to assess our U.S. insurance subsidiaries' ability to support business operations and provide dividend capacity. Our U.S. insurance subsidiaries are subject to various state statutory and regulatory restrictions that limit the amount of dividends that may be paid without prior approval from regulatory authorities. These restrictions differ by state, but are generally based on calculations incorporating statutory surplus, statutory net income, and/or investment income.

The National Association of Insurance Commissioners (NAIC) has a risk-based capital requirement for P&C insurance companies. This risk-based capital formula is used by many state regulatory authorities to identify insurance companies that may be undercapitalized and which merit further regulatory attention. These requirements are designed to monitor capital adequacy using a formula that prescribes a series of risk measurements to determine a minimum capital amount for an insurance company, based on the profile of the individual company. The ratio of a company's actual policyholder surplus to its minimum capital requirement will determine whether any state regulatory action is required. There are progressive risk-based capital failure levels that trigger more stringent regulatory action. If an insurer's policyholders' surplus falls below the Mandatory Control Level (70 percent of the Authorized Control Level, as defined by the NAIC), the relevant insurance commissioner is required to place the insurer under regulatory control.

However, an insurance regulator may allow a P&C company operating below the Mandatory Control Level that is writing no business and is running off its existing business to continue its run-off. Brandywine is running off its liabilities consistent with the terms of an order issued by the Insurance Commissioner of Pennsylvania. This includes periodic reporting obligations to the Department.

Government intervention continued in the insurance and reinsurance markets in relation to terrorism coverage in the U.S. (and through industry initiatives in other countries). The U.S. Terrorism Risk Insurance Act (TRIA), which was enacted in 2002 to ensure the availability of insurance coverage for certain types of terrorist acts in the U.S., was extended in December 2019 through December 31, 2027, and applies to certain of our operations.

From time to time, Chubb and its subsidiaries and affiliates receive inquiries from state agencies and attorneys general, with which we generally comply, seeking information concerning business practices, such as underwriting and non-traditional or loss mitigation insurance products. Moreover, many recent factors, such as consequences of and reactions to industry and economic conditions and focus on domestic issues, have contributed to the potential for change in the legal and regulatory framework applicable to Chubb's U.S. operations and businesses. We cannot assure that changes in laws or investigative or enforcement activities in the various states in the U.S. will not have a material adverse impact on our financial condition, results of operations, or business practices.

We are subject to numerous U.S. federal and state laws governing the protection of personal and confidential information of our clients or employees. These laws and regulations are increasing in complexity, and the requirements are extensive and detailed. Numerous states require us to certify our compliance with their data protection laws.

We are subject to the New York Department of Financial Services' Cybersecurity Regulation (the NYDFS Cybersecurity Regulation) which mandates detailed cybersecurity standards for all institutions, including insurance entities, authorized by the NYDFS to operate in New York. Among the requirements are the maintenance of a cybersecurity program with governance controls, risk-based minimum data security standards for technology systems, cyber breach preparedness and response requirements, including reporting obligations, vendor oversight, training, and program record keeping and certification obligations. Because our North America systems are integrated, our companies domiciled in other states may also be impacted by this requirement.

Additionally, the NAIC adopted an Insurance Data Security Model Law, which require licensed insurance entities to comply with detailed information security requirements. The NAIC model law is similar in many respects to the NYDFS Cybersecurity Regulation.

Bermuda Operations
The Insurance Act 1978 of Bermuda and related regulations, as amended (the Insurance Act), regulates the insurance business of our Bermuda domiciled (re)insurance subsidiaries (Bermuda domiciled subsidiaries) and provides that no person may carry on any insurance business in or from within Bermuda unless registered as an insurer by the Bermuda Monetary Authority (BMA). The Insurance Act imposes solvency and liquidity standards and auditing and reporting requirements on Bermuda insurance companies and grants the BMA powers to supervise, investigate, and intervene in the affairs of insurance companies.

Bermuda domiciled subsidiaries must prepare and file with the BMA, audited annual statutory financial statements and audited annual financial statements prepared in accordance with accounting principles generally accepted in the U.S. (GAAP), International Financial Reporting Standards (IFRS), or any such other generally accepted accounting principles as the BMA may recognize. These audited financial statements are made public by the BMA. The Insurance Act prescribes rules for the preparation and content of the statutory financial statements that require Bermuda domiciled subsidiaries to give detailed information and analyses regarding premiums, claims, reinsurance, and investments. In addition, the Bermuda domiciled subsidiaries are required to prepare and publish a Financial Condition Report (FCR). The FCR provides details of measures governing the business operations, corporate governance framework, solvency and financial performance. The FCR must be filed with the BMA and requires Bermuda insurance companies to make the FCR publicly available.

Bermuda's regulatory regime provides a risk-based capital model, termed the Bermuda Solvency Capital Requirement (BSCR), as a tool to assist the BMA both in measuring risk and in determining appropriate levels of capitalization. The BSCR employs a standard mathematical model that correlates the risk underwritten by Bermuda insurers to their capital. The BSCR framework applies a standard measurement format to the risk associated with an insurer's assets, liabilities, and premiums, including a formula to take into account catastrophe risk exposure.

The BMA established risk-based regulatory capital adequacy and solvency margin requirements for Bermuda insurers that mandate that a Bermuda domiciled subsidiary's Enhanced Capital Requirement (ECR) be calculated by either (a) BSCR, or (b) an internal capital model which the BMA has approved for use for this purpose. The Bermuda domiciled subsidiaries use the BSCR in calculating their solvency requirements. Bermuda statutory reporting rules include an Economic Balance Sheet (EBS) framework. The EBS framework is embedded as part of the BSCR and forms the basis of our ECR.

In order to minimize the risk of a shortfall in capital arising from an unexpected adverse deviation and in moving towards the implementation of a risk based capital approach, the BMA has established a threshold capital level, (termed the Target Capital Level (TCL)), set at 120 percent of ECR, that serves as an early warning tool for the BMA. Failure to maintain statutory capital at least equal to the TCL would likely result in increased BMA regulatory oversight.

Under the Insurance Act, Chubb's Bermuda domiciled subsidiaries are prohibited from declaring or paying any dividends of more than 25 percent of total statutory capital and surplus, as shown in its previous financial year unconsolidated statutory balance sheet, unless at least seven days before payment of the dividends, it files with the BMA an affidavit that it will continue to meet its required solvency margins. Furthermore, Bermuda domiciled subsidiaries may only declare and pay a dividend from retained earnings and a dividend or distribution from contributed surplus if it has no reasonable grounds for believing that it is, or would after the payment be, unable to pay its liabilities as they become due, or if the realizable value of its assets would be less than the aggregate of its liabilities and its issued share capital and share premium accounts.

In addition, Chubb's Bermuda domiciled subsidiaries must obtain the BMA's prior approval before reducing total statutory capital, as shown in its previous financial year statutory balance sheet, by 15 percent or more.

Other International Operations
The extent of insurance regulation varies significantly among the countries in which non-U.S. Chubb operations conduct business. While each country imposes licensing, solvency, auditing, and financial reporting requirements, the type and extent of the requirements differ substantially. For example:

- in some countries, insurers are required to prepare and file monthly and/or quarterly financial reports, and in others, only annual reports;
- some regulators require intermediaries to be involved in the sale of insurance products, whereas other regulators permit direct sales contact between the insurer and the customer;
- the extent of restrictions imposed upon an insurer's use of local and offshore reinsurance vary;
- policy form filing and rate regulation vary by country;
- the frequency of contact and periodic on-site examinations by insurance authorities differ by country; and
- regulatory requirements relating to insurer dividend policies vary by country.

Significant variations can also be found in the size, structure, and resources of the local regulatory departments that oversee insurance activities. Certain regulators prefer close relationships with all subject insurers and others operate a risk-based approach.

Chubb operates in some countries through subsidiaries and in some countries through branches of subsidiaries. Local capital requirements applicable to a subsidiary generally include its branches. Certain Chubb companies are jointly owned with local companies to comply with legal requirements for local ownership. Other legal requirements include discretionary licensing procedures, compulsory cessions of reinsurance, local retention of funds and records, data privacy and protection program requirements, and foreign exchange controls. Chubb's international companies are also subject to multinational application of certain U.S. laws.

There are various regulatory bodies and initiatives that impact Chubb in multiple international jurisdictions and the potential for significant impact on Chubb could be heightened as a result of recent industry and economic developments.

In 2016, the United Kingdom (UK) voted in a national referendum to withdraw from the EU. In anticipation of the UK leaving the EU, effective January 1, 2019, we redomiciled the headquarters of our European carriers to Paris, France, which is also the principal office for our Continental European operations. Chubb continues to have a substantial presence in London in addition to its offices and operations across the UK and EU.

In 2018, the EU's General Data Protection Regulation (GDPR) came into effect. The GDPR is a privacy regulation with protection for the personal data of EU residents on a global basis.

Enterprise Risk Management
As an insurer, Chubb is in the business of profitably managing risk for its customers. Since risk management must permeate an organization conducting a global insurance business, we have an established Enterprise Risk Management (ERM) framework that is integrated into management of our businesses and is led by Chubb's senior management. As a result, ERM is a part of the day-to-day management of Chubb and its operations.

Our global ERM framework is broadly multi-disciplinary and its strategic objectives include:

- **External Risks**: identify, analyze, quantify, and where possible, mitigate significant external risks that could materially hamper the financial condition of Chubb and/or the achievement of corporate business objectives over the next 36 months;

- **Exposure Accumulations**: identify and quantify the accumulation of exposure to individual counterparties, products or industry sectors, particularly those that materially extend across or correlate between business units or divisions and/or the balance sheet;
- **Risk Modeling**: develop and use various data-sets, analytical tools, metrics and processes (including economic capital models and advanced analytics, including catastrophe models to quantify natural catastrophe risk for product pricing, risk management, capital allocation and to simulate and estimate hurricane losses) that help business and corporate leaders make informed underwriting, portfolio management and risk management decisions within a consistent risk/reward framework;
- **Governance**:
  - establish and coordinate risk guidelines that reflect the corporate appetite for risk;
  - monitor exposure accumulations relative to established guidelines; and
  - ensure effective internal risk management communication up to management and the Board, (including our Risk & Finance Committee and our Nominating & Governance Committee), down to the various business units and legal entities, and across the firm; and
- **Disclosure**: develop protocols and processes for risk-related disclosure internally as well as externally to rating agencies, regulators, shareholders and analysts.

Chubb Group's Risk and Underwriting Committee (RUC) reports to and assists the Chief Executive Officer in the oversight and review of the ERM framework which covers the processes and guidelines used to manage insurance risk, financial risk, strategic risk, and operational risk. The RUC is chaired by Chubb Group’s Chief Risk Officer. The RUC meets at least monthly, and is comprised of Chubb Group's most senior executives, in addition to the Chair, including the Chief Executive Officer, Chief Operating Officer, Chief Financial Officer, Chief Investment Officer, Chief Actuary, Chief Claims Officer, General Counsel, President – North America Commercial and Personal Insurance, President – North America Major Accounts and Specialty Insurance, President – Overseas General Insurance, and Chief Underwriting Officer.

The RUC is assisted in its activities by Chubb's Enterprise Risk Unit (ERU) and Product Boards. The ERU is responsible for the collation and analysis of risk insight in two key areas. First, external information that provides insight to the RUC on existing or emerging risks that might significantly impact Chubb's key objectives and second, internal risk aggregations arising from Chubb's business writings and other activities such as investments and operations. The ERU is independent of the operating units and reports to our Chief Risk Officer. The Product Boards exist to provide oversight for products that we offer globally. A Product Board currently exists for each of Chubb's major product areas. Each Product Board is responsible for ensuring consistency in underwriting and pricing standards, identification of emerging issues, and guidelines for relevant accumulations.

Chubb's Chief Risk Officer also reports to the Board's Risk & Finance Committee, which helps execute the Board's supervisory responsibilities pertaining to ERM. The role of the Risk & Finance Committee includes evaluation of the integrity and effectiveness of our ERM procedures, systems, and information; governance on major policy decisions pertaining to risk aggregation and minimization; and assessment of our major decisions and preparedness levels pertaining to perceived material risks. The Audit Committee meets annually and on an as-needed basis with the Risk & Finance Committee in order to exercise its duties under New York Stock Exchange Rules.

Others within the ERM structure contribute toward accomplishing Chubb's ERM objectives, including regional management, Corporate Underwriting, Internal Audit, Compliance, external consultants, and managers of our internal control processes and procedures.

Tax Matters

Refer to “Risk Factors”, under Item 1A and Note 1 o) and Note 8 to the Consolidated Financial Statements, under Item 8.

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Information about our Executive Officers

Name	Age	Position
Evan G. Greenberg	65	Chairman, President, Chief Executive Officer, and Director
John W. Keogh	55	Executive Vice Chairman and Chief Operating Officer
Philip V. Bancroft	60	Executive Vice President and Chief Financial Officer
John J. Lupica	54	Vice Chairman; President, North America Major Accounts & Specialty Insurance
Joseph F. Wayland	62	Executive Vice President and General Counsel
Sean Ringsted	57	Executive Vice President, Chief Digital Officer, and Chief Risk Officer
Timothy A. Boroughs	70	Executive Vice President and Chief Investment Officer
Paul J. Krump	60	Executive Vice President; President, North America Commercial and Personal Insurance
Juan Luis Ortega	45	Executive Vice President; President, Overseas General Insurance

Evan G. Greenberg has been a director of Chubb Limited since August 2002. Mr. Greenberg was elected Chairman of the Board of Directors in May 2007. Mr. Greenberg was a director of The Coca-Cola Company from February 2011 until his resignation in October 2016. Mr. Greenberg was appointed to the position of President and Chief Executive Officer of Chubb Limited in May 2004, and in June 2003, was appointed President and Chief Operating Officer of Chubb Limited. Mr. Greenberg was appointed to the position of Chief Executive Officer of Chubb Overseas General in April 2002. He joined Chubb as Vice Chairman, Chubb Limited, and Chief Executive Officer of Chubb Tempest Re in November 2001. Prior to joining Chubb, Mr. Greenberg was most recently President and Chief Operating Officer of American International Group (AIG), a position he held from 1997 until 2000.

John W. Keogh was appointed Executive Vice Chairman of Chubb Limited in November 2015. Mr. Keogh has served as Chief Operating Officer of Chubb Limited since July 2011 and Vice Chairman of Chubb Limited and Chubb Group Holdings since August 2010. Mr. Keogh joined Chubb as Chief Executive Officer of Overseas General Insurance in April 2006 and became Chairman of Overseas General Insurance in August 2010. Prior to joining Chubb, Mr. Keogh served as Senior Vice President, Domestic General Insurance of AIG, and President and Chief Executive Officer of National Union Fire Insurance Company, AIG's member company that specializes in D&O and fiduciary liability coverages. Mr. Keogh joined AIG in 1986. He served in a number of other senior positions there including as Executive Vice President of AIG's Domestic Brokerage Group and as President and Chief Operating Officer of AIG's Lexington Insurance Company unit.

Philip V. Bancroft was appointed Chief Financial Officer of Chubb Limited in January 2002. For nearly 20 years, Mr. Bancroft worked for PricewaterhouseCoopers LLP. Prior to joining Chubb, he served as partner-in-charge of the New York Regional Insurance Practice. Mr. Bancroft had been a partner with PricewaterhouseCoopers LLP for ten years.

John J. Lupica was appointed President, North America Major Accounts & Specialty Insurance in January 2016, Vice Chairman of Chubb Limited and Chubb Group Holdings in November 2013 and Chairman, Insurance - North America, in July 2011. Mr. Lupica had been Chief Operating Officer, Insurance - North America, since 2010 and President of ACE USA since 2006. He also previously served as Division President of U.S. Professional Risk business and U.S. Regional Operations. Mr. Lupica joined Chubb as Executive Vice President of Professional Risk in 2000. Prior to joining Chubb, he served as Senior Vice President for Munich-American Risk Partners, Inc. He also held various management positions at AIG.

Joseph F. Wayland was appointed Executive Vice President of Chubb Limited in January 2016, General Counsel and Secretary of Chubb Limited in July 2013. Mr. Wayland joined Chubb from the law firm of Simpson Thacher & Bartlett LLP, where he was a partner since 1994. From 2010 to 2012, he served in the United States Department of Justice, first as Deputy Assistant Attorney General of the Antitrust Division, and was later appointed as the Acting Assistant Attorney General in charge of that division.

Sean Ringsted was appointed Executive Vice President and Chief Digital Officer in February 2017 and Chief Risk Officer in November 2008. Mr. Ringsted previously served as Chief Actuary of Chubb Limited from November 2008 to January 2017. Mr. Ringsted’s previous roles at Chubb also include Chief Actuary for Chubb Group from 2004 to 2008, Executive Vice President and Chief Risk Officer for Chubb Tempest Re from 2002 to 2004, and Senior Vice President and Chief Actuary for Chubb Tempest Re from 1998 to 2002. Prior to joining Chubb, Mr. Ringsted was a consultant at Tillinghast-Towers Perrin.

Timothy A. Boroughs was appointed Executive Vice President and Chief Investment Officer of Chubb Group in June 2000. Prior to joining Chubb, Mr. Boroughs was Director of Fixed Income at Tudor Investment Corporation from 1997 to 2000, and Managing Partner and Director of Global Leveraged Investment Activity at Fischer Francis Trees & Watts from 1976 to 1997.

Paul J. Krump was appointed Executive Vice President, Chubb Group and President North America Commercial and Personal Insurance in January 2016. Prior to Chubb Limited's January 2016 acquisition of The Chubb Corporation, Mr. Krump was Chief Operating Officer of The Chubb Corporation, responsible for the company's Commercial, Specialty, Personal and Accident & Health insurance lines; Claims; Global Field Operations; Information Technology; Human Resources; Communications; and External Affairs. Mr. Krump joined The Chubb Corporation in 1982 as a commercial underwriting trainee in the Minneapolis office. He held numerous headquarters and field positions in the United States and Europe, including President of Personal Lines and Claims and President of Commercial and Specialty Lines.

Juan Luis Ortega was appointed Executive Vice President, Chubb Group and President, Overseas General Insurance in August 2019. Mr. Ortega previously served as Senior Vice President, Chubb Group and Regional President of Latin America since 2016 and Regional President of Asia Pacific from 2013 to 2016. Mr. Ortega's previous roles at Chubb also include Senior Vice President, Accident & Health, for the Asia Pacific region from 2011 to 2013 and Senior Vice President and Regional Head of Accident & Health for the Latin America region from 2008 to 2010. Mr. Ortega joined Chubb in 1999 and advanced through a series of accident and health and credit insurance management positions in Miami, Puerto Rico and Mexico, before being named Country President of Chile in 2005.

ITEM 1A. Risk Factors

Factors that could have a material impact on our results of operations or financial condition are outlined below. Additional risks not presently known to us or that we currently deem insignificant may also impair our business or results of operations as they become known or as facts and circumstances change. Any of the risks described below could result in a material adverse effect on our results of operations or financial condition.

Insurance

Our results of operations or financial condition could be adversely affected by the occurrence of natural and man-made disasters.

We have substantial exposure to losses resulting from natural disasters, man-made catastrophes such as terrorism or cyber-attack, and other catastrophic events, including pandemics. This could impact a variety of our businesses, including our commercial and personal lines, and life and accident and health (A&H) products. Catastrophes can be caused by various events, including hurricanes, typhoons, earthquakes, hailstorms, droughts, explosions, severe winter weather, fires, war, acts of terrorism, nuclear accidents, political instability, and other natural or man-made disasters, including a global or other wide-impact pandemic or a significant cyber-attack. The incidence and severity of catastrophes are inherently unpredictable and our losses from catastrophes could be substantial. In addition, climate change and resulting changes in global temperatures, weather patterns, and sea levels may both increase the frequency and severity of natural catastrophes and the resulting losses in the future and impact our risk modeling assumptions. We cannot predict the impact that changing climate conditions, if any, may have on our results of operations or our financial condition. Additionally, we cannot predict how legal, regulatory and/or social responses to concerns around global climate change may impact our business. The occurrence of claims from catastrophic events could result in substantial volatility in our results of operations or financial condition for any fiscal quarter or year. Although we attempt to manage our exposure to such events through the use of underwriting controls, risk models, and the purchase of third-party reinsurance, catastrophic events are inherently unpredictable and the actual nature of such events when they occur could be more frequent or severe than contemplated in our pricing and risk management expectations. As a result, the occurrence of one or more catastrophic events could have an adverse effect on our results of operations and financial condition.

If actual claims exceed our loss reserves, our financial results could be adversely affected.

Our results of operations and financial condition depend upon our ability to accurately assess the potential losses associated with the risks that we insure and reinsure. We establish reserves for unpaid losses and loss expenses, which are estimates of future payments of reported and unreported claims for losses and related expenses, with respect to insured events that have occurred at or prior to the balance sheet date. The process of establishing reserves can be highly complex and is subject to considerable variability as it requires the use of informed estimates and judgments.

Actuarial staff in each of our segments regularly evaluates the levels of loss reserves. Any such evaluation could result in future changes in estimates of losses or reinsurance recoverables and would be reflected in our results of operations in the period in which the estimates are changed. Losses and loss expenses are charged to income as incurred. During the loss settlement period, which can be many years in duration for some of our lines of business, additional facts regarding individual claims and trends often will become known which may result in a change in overall reserves. In addition, application of statistical and actuarial methods may require the adjustment of overall reserves upward or downward from time to time.

Included in our loss reserves are liabilities for latent claims such as asbestos and environmental (A&E), which are principally related to claims arising from remediation costs associated with hazardous waste sites and bodily-injury claims related to exposure to asbestos products and environmental hazards. At December 31, 2019, gross A&E liabilities represented approximately 3.2 percent of our gross loss reserves. The estimation of these liabilities is subject to many complex variables including: the current legal environment; specific settlements that may be used as precedents to settle future claims; assumptions regarding trends with respect to claim severity and the frequency of higher severity claims; assumptions regarding the ability to allocate liability among defendants (including bankruptcy trusts) and other insurers; the ability of a claimant to bring a claim in a state in which it has no residency or exposure; the ability of a policyholder to claim the right to non-products coverage; whether high-level excess policies have the potential to be accessed given the policyholder's claim trends and liability situation; payments to unimpaired claimants; and the potential liability of peripheral defendants. Accordingly, the ultimate settlement of losses, arising from either latent or non-latent causes, may be significantly greater or less than the loss and loss expense reserves held at the balance sheet date. In addition, the amount and timing of the settlement of our P&C liabilities are uncertain and our actual payments could be higher than contemplated in our loss reserves owing to the impact of insurance, judicial decisions, and/or social inflation. If our loss reserves are determined to be inadequate, we may be required to increase loss reserves at the time of the determination and our net income and capital may be reduced.

The effects of emerging claim and coverage issues on our business are uncertain.
As industry practices and legislative, regulatory, judicial, social, financial, technological and other environmental conditions change, unexpected and unintended issues related to claims and coverage may emerge. These issues may adversely affect our business by either extending coverage beyond our underwriting intent or by increasing the frequency and severity of claims. In some instances, these changes may not become apparent until after we have issued insurance or reinsurance contracts that are affected by the changes. For example, recently enacted "reviver" legislation in certain states does allow civil claims relating to molestation and abuse to be asserted against policyholders that would otherwise be barred by statutes of limitations. As a result, the full extent of liability under our insurance or reinsurance contracts may not be known for many years after issuance.

The failure of any of the loss limitation methods we use could have an adverse effect on our results of operations and financial condition.
We seek to manage our loss exposure by maintaining a disciplined underwriting process throughout our insurance operations. We also look to limit our loss exposure by writing a number of our insurance and reinsurance contracts on an excess of loss basis. Excess of loss insurance and reinsurance indemnifies the insured against losses in excess of a specified amount. In addition, we limit program size for each client and purchase third-party reinsurance for our own account. In the case of our assumed proportional reinsurance treaties, we seek per occurrence limitations or loss and loss expense ratio caps to limit the impact of losses ceded by the client. In proportional reinsurance, the reinsurer shares a proportional part of the premiums and losses of the reinsured. 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.

However, there are inherent limitations in all of these tactics and no assurance can be given against the possibility of an event or series of events that could result in loss levels that could have an adverse effect on our financial condition or results of operations. It is also possible that losses could manifest themselves in ways that we do not anticipate and that our risk mitigation strategies are not designed to address. Additionally, various provisions of our policies, such as limitations or exclusions from coverage or choice of forum negotiated to limit our risks, may not be enforceable in the manner we intend. As a result, one or more natural catastrophes and/or terrorism or other events could result in claims that substantially exceed our expectations, which could have an adverse effect on our results of operations and financial condition.

We may be unable to purchase reinsurance, and/or if we successfully purchase reinsurance, we are subject to the possibility of non-payment.
We purchase protection from third parties including, but not limited to, reinsurance to protect against catastrophes and other sources of volatility, to increase the amount of protection we can provide our clients, and as part of our overall risk management strategy. Our reinsurance business also purchases retrocessional protection which allows a reinsurer to cede to another company all or part of the reinsurance originally assumed by the reinsurer. A reinsurer's or retrocessionaire's insolvency or inability or unwillingness to make timely payments under the terms of its reinsurance agreement with us could have an adverse effect on us because we remain liable to the insured. From time to time, market conditions have limited, and in some cases have prevented, insurers and reinsurers from obtaining the types and amounts of reinsurance or retrocessional reinsurance that they consider adequate for their business needs.

There is no guarantee our desired amounts of reinsurance or retrocessional reinsurance will be available in the marketplace in the future. In addition to capacity risk, the remaining capacity may not be on terms we deem appropriate or acceptable or with companies with whom we want to do business. Finally, we face some degree of counterparty risk whenever we purchase reinsurance or retrocessional reinsurance. Consequently, the insolvency of these counterparties, or the inability, or unwillingness of any of our present or future reinsurers to make timely payments to us under the terms of our reinsurance or retrocessional agreements could have an adverse effect on us. At December 31, 2019, we had $15.4 billion of reinsurance recoverables, net of reserves for uncollectible recoverables.

Certain active Chubb companies are primarily liable for A&E and other exposures they have reinsured to our inactive run-off company Century Indemnity Company (Century). At December 31, 2019, the aggregate reinsurance balances ceded by our active subsidiaries to Century were approximately $1.5 billion. Should Century's loss reserves experience adverse development in the future and should Century be placed into rehabilitation or liquidation, the reinsurance recoverables due from Century to its affiliates would be payable only after the payment in full of third-party expenses and liabilities, including administrative expenses and direct policy liabilities. Thus, the intercompany reinsurance recoverables would be at risk to the extent of the shortage of assets remaining to pay these recoverables. While we believe the intercompany reinsurance recoverables from Century are not impaired at this time, we cannot assure that adverse development with respect to Century's loss reserves, if manifested, will not result in Century's insolvency, which could result in our recognizing a loss to the extent of any uncollectible reinsurance from Century. This could have an adverse effect on our results of operations and financial condition.

Our net income may be volatile because certain products sold by our Life Insurance business expose us to reserve and fair value liability changes that are directly affected by market and other factors and assumptions.
Our pricing, establishment of reserves for future policy benefits and valuation of life insurance and annuity products, including reinsurance programs, are based upon various assumptions, including but not limited to equity market changes, interest rates, mortality rates, morbidity rates, and policyholder behavior. The process of establishing reserves for future policy benefits relies on our ability to accurately estimate insured events that have not yet occurred but that are expected to occur in future periods. Significant deviations in actual experience from assumptions used for pricing and for reserves for future policy benefits could have an adverse effect on the profitability of our products and our business.

Under reinsurance programs covering variable annuity guarantees, we assumed the risk of guaranteed minimum death benefits (GMDB) and guaranteed living benefits (GLB), principally guaranteed minimum income benefits (GMIB), associated with variable annuity contracts. We ceased writing this business in 2007. Our net income is directly impacted by changes in the reserves calculated in connection with the reinsurance of GMDB and GLB liabilities. In addition, our net income is directly impacted by the change in the fair value of the GLB liability. Reported liabilities for both GMDB and GLB reinsurance are determined using internal valuation models which require considerable judgment and are subject to significant uncertainty. Refer to the “Critical Accounting Estimates – Guaranteed living benefits (GLB) derivatives” under Item 7 and “Quantitative and Qualitative Disclosures about Market Risk – Reinsurance of GMDB and GLB guarantees” under Item 7A for additional information on the assumptions used in this program. We view our variable annuity reinsurance business as having a similar risk profile to that of catastrophe reinsurance, with the probability of long-term economic loss relatively small at the time of pricing. Adverse changes in market factors and policyholder behavior will have an impact on both Life Insurance underwriting income and consolidated net income.

Payment of obligations under surety bonds could have an adverse effect on our results of operations.
The surety business tends to be characterized by infrequent but potentially high severity losses. The majority of our surety obligations are intended to be performance-based guarantees. When losses occur, they may be mitigated, at times, by recovery rights to the customer’s assets, contract payments, and collateral and bankruptcy recoveries. We have substantial commercial and construction surety exposure for current and prior customers. In that regard, we have exposures related to surety bonds issued on behalf of companies that have experienced or may experience deterioration in creditworthiness. If the financial condition of these companies were adversely affected by the economy or otherwise, we may experience an increase in filed claims and may incur high severity losses, which could have an adverse effect on our results of operations.

Our exposure to various commercial and contractual counterparties, our reliance on brokers, and certain of our policies may subject us to credit risk.
We have exposure to counterparties through a variety of commercial transactions and arrangements, including reinsurance transactions; agreements with banks, hedge funds and other investment vehicles; and derivative transactions, that expose us to credit risk in the event our counterparty fails to perform its obligations. This includes exposure to financial institutions in the form of secured and unsecured debt instruments and equity securities. Moreover, we paid deposits in connection with our pending acquisition of additional shares of Huatai Insurance Group Company Limited (Huatai Group), which exposes us to risk if the transactions are not completed.

In accordance with industry practice, we generally pay amounts owed on claims to brokers who, in turn, remit these amounts to the insured or ceding insurer. Although the law is unsettled and depends upon the facts and circumstances of the particular case, in some jurisdictions, if a broker fails to make such a payment, we might remain liable to the insured or ceding insurer for the deficiency. Conversely, in certain jurisdictions, if a broker does not remit premiums paid for these policies over to us, these premiums might be considered to have been paid and the insured or ceding insurer 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 a broker with whom we transact business. However, due to the unsettled and fact-specific nature of the law, we are unable to quantify our exposure to this risk. To date, we have not experienced any material losses related to this credit risk.

Under the terms of certain high-deductible policies which we offer, such as workers’ compensation and general liability, our customers are responsible to reimburse us for an agreed-upon dollar amount per claim. In nearly all cases we are required under such policies to pay covered claims first, and then seek reimbursement for amounts within the applicable deductible from our customers. This obligation subjects us to credit risk from these customers. While we generally seek to mitigate this risk through collateral agreements and maintain a provision for uncollectible accounts associated with this credit exposure, an increased inability of customers to reimburse us in this context could have an adverse effect on our financial condition and results of operations. In addition, a lack of credit available to our customers could impact our ability to collateralize this risk to our satisfaction, which in turn, could reduce the amount of high-deductible policies we could offer.

Since we depend on a few distribution and bancassurance partners for a large portion of our revenues, loss of business provided by any one of them could adversely affect us.
We market our insurance and reinsurance worldwide primarily through independent insurance agents, insurance and reinsurance brokers, and bancassurance relationships. Accordingly, our business is dependent on the willingness of these agents and brokers to recommend our products to their customers, who may also promote and distribute the products of our competitors. Deterioration in relationships with our agent and broker distribution network or their increased promotion and distribution of our competitors' products could adversely affect our ability to sell our products. Loss of all or a substantial portion of the business provided by one or more of these agents and brokers could have an adverse effect on our business.

Financial

Our investment performance may affect our financial results and our ability to conduct business.
Our investment assets are invested by professional investment management firms under the direction of our management team in accordance with investment guidelines approved by the Risk & Finance Committee of the Board of Directors. Although our investment guidelines stress diversification of risks and conservation of principal and liquidity, our investments are subject to market risks and risks inherent in individual securities. Interest rates are highly sensitive to many factors, including inflation, monetary and fiscal policies, and domestic and international political conditions. Given the risk that London Interbank Offered Rate (LIBOR) will no longer be available, we are monitoring industry efforts via our external investment managers to transition away from LIBOR by the end of 2021. The volatility of our losses may force us to liquidate securities, which may cause us to incur capital losses. Realized and unrealized losses in our investment portfolio would reduce our book value, and if significant, can affect our ability to conduct business.

Volatility in interest rates could impact the performance of our investment portfolio which could have an adverse effect on our investment income and operating results. Although we take measures to manage the risks of investing in a changing interest rate environment, we may not be able to effectively mitigate interest rate sensitivity. Our mitigation efforts include maintaining a high quality portfolio of primarily fixed income investments with a relatively short duration to reduce the effect of interest rate changes on book value. A significant increase in interest rates would generally have an adverse effect on our book value. Our life insurance investments typically focus on longer duration bonds to better match the obligations of this business. For the life insurance business, policyholder behavior may be influenced by changing interest rate conditions and require a re-balancing of duration to effectively manage our asset/liability position.

As stated, our fixed income portfolio is primarily invested in high quality, investment-grade securities. However, a smaller portion of the portfolio, approximately 16 percent at December 31, 2019, is invested in below investment-grade securities. These securities, which pay a higher rate of interest, also have a higher degree of credit or default risk and may also be less liquid in times of economic weakness or market disruptions. While we have put in place procedures to monitor the credit risk and liquidity of our invested assets, it is possible that, in periods of economic weakness (such as recession), we may experience credit or default losses in our portfolio, which could adversely affect our results of operations and financial condition.

As a part of our ongoing analysis of our investment portfolio, we are required to assess whether the fixed maturities we hold for which we have recorded an unrealized loss have been “other-than-temporarily impaired” under GAAP, which implies an inability to recover the full economic benefits of these securities. Refer to Note 2 to the Consolidated Financial Statements for additional information. This analysis requires a high degree of judgment and requires us to make certain assessments about the potential for recovery of the assets we hold. Declines in relevant stock and other financial markets, and other factors impacting the value of our investments, could result in impairments and could adversely affect our net income and other financial results.

We may require additional capital or financing sources in the future, which may not be available or may be available only on unfavorable terms.
Our future capital and financing requirements 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, as well as our investment performance and capital expenditure obligations, including with respect to acquisitions. We may need to raise additional funds through financings

or access funds through existing or new credit facilities or through short-term repurchase agreements. We also from time to time seek to refinance debt or credit as amounts become due or commitments expire. Any equity or debt financing or refinancing, if available at all, may be on terms that are not favorable to us. In the case of equity financings, dilution to our shareholders could result, and in any case, such securities may have rights, preferences, and privileges that are senior to those of our Common Shares. Our access to funds under existing credit facilities is dependent on the ability of the banks that are parties to the facilities to meet their funding commitments. Under Swiss law we would be prohibited from selling shares in an equity financing at a purchase price below our then-current par value. If we cannot obtain adequate capital or sources of credit on favorable terms, or at all, we could be forced to use assets otherwise available for our business operations, and our business, results of operations, and financial condition could be adversely affected.

We may be required to post additional collateral because of changes in our reinsurance liabilities to regulated insurance companies, or because of regulatory changes that affect our companies.
If our reinsurance liabilities increase, including in our property & casualty and variable annuity reinsurance businesses, we may be required to post additional collateral for insurance company clients. In addition, regulatory changes sometimes affect our obligations to post collateral. The need to post this additional collateral, if significant enough, may require us to sell investments at a loss in order to provide securities of suitable credit quality or otherwise secure adequate capital at an unattractive cost. This could adversely impact our net income and liquidity and capital resources.

U.S. and global economic and financial industry events and their consequences could harm our business, our liquidity and financial condition, and our stock price.
The consequences of adverse global or regional market and economic conditions may affect (among other aspects of our business) the demand for and claims made under our products, the ability of customers, counterparties, and others to establish or maintain their relationships with us, our ability to access and efficiently use internal and external capital resources, the availability of reinsurance protection, the risks we assume under reinsurance programs covering variable annuity guarantees, and our investment performance. The increasing impact of climate change could affect our cost of claims, loss ratios, and financial results. Volatility in the U.S. and other securities markets may adversely affect our stock price.

A decline in our financial strength ratings could affect our standing among distribution partners and customers and cause our premiums and earnings to decrease. A decline in our debt ratings could increase our borrowing costs and impact our ability to access capital markets.
Ratings are an important factor in establishing the competitive position of insurance and reinsurance companies. The objective of these rating systems is to provide an opinion of an insurer's financial strength and ability to meet ongoing obligations to its policyholders. A ratings downgrade could result in a substantial loss of business as insureds, ceding companies, and brokers move to other insurers and reinsurers with higher ratings. If one or more of our debt ratings were downgraded, we could also incur higher borrowing costs, and our ability to access the capital markets could be impacted. Additionally, we could be required to post collateral or be faced with the cancellation of policies and resulting premium in certain circumstances. We cannot give any assurance regarding whether or to what extent any of the rating agencies might downgrade our ratings in the future.

Our ability to pay dividends and/or to make payments on indebtedness may be constrained by our holding company structure.
Chubb Limited is a holding company that owns shares of its operating insurance and reinsurance subsidiaries along with several loans receivable from affiliates. Beyond this it does not itself have any significant operations or liquid assets. Repayment of loans receivable, guarantee fees and dividends and other permitted distributions from our insurance subsidiaries are its primary sources of funds to meet ongoing cash requirements, including any future debt service payments, other expenses, repurchases of its shares, and to pay dividends to our shareholders. Some of our insurance subsidiaries are subject to significant regulatory restrictions limiting their ability to declare and pay dividends. The inability of our insurance subsidiaries to pay dividends (or other intercompany amounts due, such as intercompany debt obligations) in an amount sufficient to enable us to meet our cash requirements at the holding company level could have an adverse effect on our operations and our ability to repurchase shares and pay dividends to our shareholders.

Swiss law imposes certain restrictions on our ability to repurchase our shares.
Swiss law imposes certain withholding tax and other restrictions on a Swiss company's ability to return earnings or capital to its shareholders, including through the repurchase of its own shares. We may only repurchase shares to the extent that sufficient freely distributable reserves are available. In addition, Swiss law requires that the total par value of Chubb's acquisition of treasury shares must not be in excess of 10 percent of its total share capital. As a result, in order to maintain our share repurchase program, our shareholders must periodically authorize, through ballot item approval at our annual general meeting,

a reduction in our share capital through the cancellation of designated blocks of repurchased shares held in treasury. If our shareholders do not approve the cancellation of previously repurchased shares, we may be unable to return capital to shareholders through share repurchases in the future. Furthermore, our current repurchase program relies on a Swiss tax ruling. Any future revocation or loss of our Swiss tax ruling or the inability to conduct repurchases in accordance with the ruling could also jeopardize our ability to continue repurchasing our shares.

Our operating results and shareholders' equity may be adversely affected by currency fluctuations.
Our reporting currency is the U.S. dollar. In general, we match assets and liabilities in local currencies. Where possible, capital levels in local currencies are limited to satisfy minimum regulatory requirements and to support local insurance operations. The principal currencies creating foreign exchange risk are the British pound sterling, the euro, the Mexican peso, the Brazilian real, the Korean won, the Canadian dollar, the Japanese yen, the Thai baht, the Australian dollar, and the Hong Kong dollar. At December 31, 2019, approximately 16.6 percent of our net assets were denominated in foreign currencies. We may experience losses resulting from fluctuations in the values of non-U.S. currencies, which could adversely impact our results of operations and financial condition.

Operational

The regulatory and political regimes under which we operate, and their volatility, could have an adverse effect on our business.
We may from time to time face challenges resulting from changes in applicable law and regulations in particular jurisdictions, or changes in approach to oversight of our business from insurance or other regulators.

Our insurance and reinsurance subsidiaries conduct business globally. Our businesses in each jurisdiction are subject to varying degrees of regulation and supervision. The laws and regulations of the jurisdictions in which our insurance and reinsurance subsidiaries are domiciled require, among other things, maintenance of minimum levels of statutory capital, surplus, and liquidity; various solvency standards; and periodic examinations of subsidiaries' financial condition. In some jurisdictions, laws and regulations also restrict payments of dividends and reductions of capital. Applicable statutes, regulations, and policies may also restrict the ability of these subsidiaries to write insurance and reinsurance policies, to make certain investments, and to distribute funds. The purpose of insurance laws and regulations generally is to protect policyholders and ceding insurance companies, not our shareholders. For example, some jurisdictions have enacted various consumer protection laws that make it more burdensome for insurance companies to sell policies and interact with customers in personal lines businesses. Failure to comply with such regulations can lead to significant penalties and reputational injury.

The foreign and U.S. federal and state laws and regulations that are applicable to our operations are complex and may increase the costs of regulatory compliance or subject our business to the possibility of regulatory actions or proceedings. Laws and regulations not specifically related to the insurance industry include trade sanctions that relate to certain countries, anti-money laundering laws, and anti-corruption laws. The insurance industry is also affected by political, judicial, and legal developments that may create new and expanded regulations and theories of liability. The current economic and financial climates present additional uncertainties and risks relating to increased regulation and the potential for increased involvement of the U.S. and other governments in the financial services industry.

Regulators in countries where we have operations are working with the International Association of Insurance Supervisors (IAIS) to consider changes to insurance company supervision, including with respect to group supervision and solvency requirements. The IAIS has developed a Common Framework for the Supervision of Internationally Active Insurance Groups (ComFrame) which is focused on the effective group-wide supervision of international active insurance groups (IAIGs), such as Chubb. As part of ComFrame, the IAIS has announced plans to develop an international capital standard for insurance groups. The details of ComFrame including this global capital standard and its applicability to Chubb are uncertain at this time. In addition, Chubb businesses across the EU are subject to Solvency II, a capital and risk management regime and our Bermuda businesses are subject to an equivalent of the EU's Solvency II regime. Also applicable to Chubb businesses are the requirements of the Swiss Financial Market Supervisory Authority (FINMA) whose regulations include Swiss Solvency Tests. There are also Risk Based Capital (RBC) requirements in the U.S. which are also subject to revision in response to global developments. While it is not certain how or if these actions will impact Chubb, we do not currently expect that our capital management strategies, results of operations and financial condition will be materially affected by these regulatory changes.

Evolving privacy and data security regulations could adversely affect our business.
We are subject to numerous U.S. federal and state laws and non-U.S. regulations governing the protection of personal and confidential information of our clients and employees, including in relation to medical records, credit card data and financial

information. These laws and regulations are increasing in complexity and number, change frequently, sometimes conflict, and could expose Chubb to significant monetary damages, regulatory enforcement actions, fines and/or criminal prosecution in one or more jurisdictions.

We are subject to the New York Department of Financial Services' Cybersecurity Regulation (the NYDFS Cybersecurity Regulation) which mandates detailed cybersecurity standards for all institutions, including insurance entities, authorized by the NYDFS to operate in New York. The NYDFS Cybersecurity Regulation has increased our compliance costs and could increase the risk of noncompliance and subject us to regulatory enforcement actions and penalties, as well as reputation risk.

Additionally, in 2017, the National Association of Insurance Commissioners (NAIC) adopted an Insurance Data Security Model Law, which requires licensed insurance entities to comply with detailed information security requirements. It is not yet known whether or not, and to what extent, states legislatures or insurance regulators where we operate will enact the Insurance Data Security Model Law in whole or in part, or in a modified form. Such enactments, especially if inconsistent between states or with existing laws and regulations could raise compliance costs or increase the risk of noncompliance, with the attendant risk of being subject to regulatory enforcement actions and penalties, as well as reputational harm.

The EU General Data Protection Regulation (the "GDPR"), which became effective in 2018, is a comprehensive regulation applying across all EU member states. All our business units (regardless of whether they are located in the EU) may be subject to the GDPR when personal data is processed in relation to the offer of goods and services to individuals within the EU. Our failure to comply with GDPR and other countries' privacy or data security-related laws, rules or regulations could result in significant penalties imposed by regulators, which could have an adverse effect on our business, financial condition and results of operations.

Significant other comprehensive privacy laws have been enacted by other jurisdictions, most notably the California Consumer Privacy Act (CCPA) and Brazil's Lei Geral de Protecao de Dados, which may affect our use of data and could affect our operations and subject us to fines and actions for noncompliance. In the U.S., several other states are considering similar legislation, and there are ongoing discussions regarding a National Privacy Law. New laws similar to the GDPR and the CCPA are expected to be enacted in coming years in various countries and jurisdictions in which we operate.

Political uncertainty in the United Kingdom and the European Union may lead to volatility and/or have an adverse effect on our business, our liquidity and financial condition, and our stock price.

On June 23, 2016, the United Kingdom (U.K.) voted in a national referendum to withdraw from the European Union (EU). On March 29, 2017, the U.K. government gave notice to the EU, under Article 50(2) of the Treaty on EU, of the U.K.'s intention to withdraw from the EU. The U.K. ratified the withdrawal agreement and ceased to be a Member State of the EU (Brexit) on January 31, 2020.

We have significant operations in the U.K. and other EU member states that, operationally, have been affected by Brexit. In anticipation of Brexit, we redomiciled the headquarters of our European carriers to France effective January 1, 2019. Paris is the principal office for our Continental European operations. We have a significant investment there in both financial and human resources, as well as a large portfolio of commercial and consumer insurance business throughout France. Following Brexit, Chubb will continue to have a substantial presence in London, in addition to its offices and operations across the U.K. and the EU.

Prior to Brexit, the rules governing the EU Single Market (which is made up of the 27 other EU member states and to some extent, Iceland, Liechtenstein, and Norway (together, the European Economic Area or EEA)) permitted U.K. insurers (as well as EEA insurers operating as passported branches in the U.K., such as our French companies Chubb European Group SE and ACE Europe Life SE), to underwrite risks from the U.K. into EEA member states via a "passport" prior to Brexit.

The withdrawal agreement between the U.K. and the EU includes, following Brexit, a transition or implementation period to avoid a "cliff edge" Brexit, meaning that the U.K. remains subject to, and has the benefit of, all EU legislation, including passporting rights, until December 31, 2020. This period is intended to enable the EU and the U.K. to negotiate a trade agreement for the post-Brexit relationship between the U.K. and the EU and can, pursuant to the withdrawal agreement, be extended beyond the end of 2020 with the consent of both the U.K. and the EU. However, the U.K. government included a section in the European Union (United Kingdom Withdrawal Agreement) Act 2020 that has made it illegal for the U.K. Parliament to seek an extension of the transition or implementation period from the EU. To the extent, therefore, that it proves impossible to negotiate a trade agreement between the U.K. and the EU by December 31, 2020, there remains a risk that a "cliff edge" Brexit may nevertheless arise, including the benefits of passporting rights.

Even if a free trade agreement is concluded between the U.K. and the EU prior to the end of the transition or implementation period, such free trade agreement may not maintain the passporting rights of U.K. insurers, nor deem relevant U.K. regulations to be equivalent to those of the EU. In the event that, following the end of the transition or implementation period, U.K. insurers are unable to access the EU Single Market via a passporting arrangement, a regulatory equivalence regime or other similar arrangement, such insurers may not be able to underwrite risks into EEA member states except through local branches incorporated in the EEA. Such branches might require local authorization, regulatory and prudential supervision, and capital to be deposited.

Our worldwide operations, particularly in developing nations, expose us to global geopolitical developments that could have an adverse effect on our business, liquidity, results of operations, and financial condition.
With operations in 54 countries and territories, we provide insurance and reinsurance products and services to a diverse group of clients worldwide, including operations in various developing nations. Both current and future foreign operations could be adversely affected by unfavorable geopolitical developments including law changes; tax changes; changes in trade policies; changes to visa or immigration policies; regulatory restrictions; government leadership changes; political events and upheaval; sociopolitical instability; social, political or economic instability resulting from climate change; and nationalization of our operations without compensation. Adverse activity in any one country could negatively impact operations, increase our loss exposure under certain of our insurance products, and could, otherwise, have an adverse effect on our business, liquidity, results of operations, and financial condition depending on the magnitude of the events and our net financial exposure at that time in that country.

A failure in our operational systems or infrastructure or those of third parties, including due to security breaches or cyber-attacks, could disrupt business, damage our reputation, and cause losses.
Our operations rely on the secure processing, storage, and transmission of confidential and other information and assets, including in our computer systems and networks and those of third-party service providers. Our business depends on effective information security and systems and the integrity and timeliness of the data our information systems use to run our business. Our ability to adequately price products and services, to establish reserves, to provide effective, efficient and secure service to our customers, to value our investments and to timely and accurately report our financial results also depends significantly on the integrity and availability of the data we maintain, including that within our information systems, as well as data in and assets held through third-party service providers and systems. Although we have implemented administrative and technical controls and have taken protective actions to reduce the risk of cyber incidents and to protect our information technology and assets, and although we additionally endeavor to modify such procedures as circumstances warrant and negotiate agreements with third-party providers to protect our assets, such measures may be insufficient to prevent unauthorized access, computer viruses, malware or other malicious code or cyber-attack, business compromise attacks, catastrophic events, system failures and disruptions, employee errors or malfeasance, third party (including outsourced service providers) errors or malfeasance, loss of assets and other events that could have security consequences (each, a Security Event). As the breadth and complexity of our security infrastructure continues to grow, the potential risk of a Security Event increases. Such an event or events may jeopardize Chubb's or its clients' or counterparties' confidential and other information processed and stored within Chubb, and transmitted through its computer systems and networks, or otherwise cause interruptions, delays, or malfunctions in Chubb's, its clients', its counterparties', or third parties' operations, or result in data loss or loss of assets which could result in significant losses, reputational damage or an adverse effect on our operations and critical business functions. Chubb may be required to expend significant additional resources to modify our protective measures or to investigate and remediate vulnerabilities or other exposures and to pursue recovery of lost data or assets and we may be subject to litigation and financial losses that are either not insured against or not fully covered by insurance maintained.

Despite the contingency plans and facilities we have in place and our efforts to observe the regulatory requirements surrounding information security, our ability to conduct business may be adversely affected by a disruption of the infrastructure that supports our business in the communities in which we are located, or of outsourced services or functions. This may include a disruption involving electrical, communications, transportation, or other services used by Chubb. If a disruption occurs in one location and Chubb employees in that location are unable to occupy our offices and conduct business or communicate with or travel to other locations, our ability to service and interact with clients may suffer and we may not be able to successfully implement contingency plans that depend on communication or travel.

We use analytical models to assist our decision making in key areas such as underwriting, claims, reserving, and catastrophe risks but actual results could differ materially from the model outputs and related analyses.
We use various modeling techniques (e.g., scenarios, predictive, stochastic and/or forecasting) and data analytics to analyze and estimate exposures, loss trends and other risks associated with our assets and liabilities. We use the modeled outputs and

related analyses to assist us in decision-making (e.g., underwriting, pricing, claims, reserving, reinsurance, and catastrophe risk) and to maintain competitive advantage. The modeled outputs and related analyses are subject to various assumptions, uncertainties, model errors and the inherent limitations of any statistical analysis, including the use of historical internal and industry data. In addition, the modeled outputs and related analyses may from time to time contain inaccuracies, perhaps in material respects, including as a result of inaccurate inputs or applications thereof. Climate change may make modeled outcomes less certain or produce new, non-modeled risks. Consequently, actual results may differ materially from our modeled results. If, based upon these models or other factors, we misprice our products or underestimate the frequency and/or severity of loss events, or overestimate the risks we are exposed to, new business growth and retention of our existing business may be adversely affected which could have an adverse effect on our results of operations and financial condition.

We could be adversely affected by the loss of one or more key executives or by an inability to attract and retain qualified personnel.
Our success depends on our ability to retain the services of our existing key executives and to attract and retain additional qualified personnel in the future. The loss of the services of any of our key executives or the inability to hire and retain other highly qualified personnel in the future could adversely affect our ability to conduct or grow our business. This risk may be particularly acute for us relative to some of our competitors because some of our senior executives work in countries where they are not citizens and work permit and immigration issues could adversely affect the ability to retain or hire key persons. We do not maintain key person life insurance policies with respect to our employees.

Employee error and misconduct may be difficult to detect and prevent and could adversely affect our business, results of operations, and financial condition.
Losses may result from, among other things, fraud, errors, failure to document transactions properly, failure to obtain proper internal authorization, failure to comply with underwriting or other internal guidelines, or failure to comply with regulatory requirements. It is not always possible to deter or prevent employee misconduct and the precautions that we take to prevent and detect this activity may not be effective in all cases. Resultant losses could adversely affect our business, results of operations, and financial condition.

Strategic

The continually changing landscape, including competition, technology and products, and existing and new market entrants could reduce our margins and adversely impact our business and results of operations.
Insurance and reinsurance markets are highly competitive. We compete on an international and regional basis with major U.S., Bermuda, European, and other international insurers and reinsurers and with underwriting syndicates, some of which have greater financial, technological, marketing, distribution and/or management resources than we do. In addition, capital market participants have created alternative products that are intended to compete with reinsurance products. We also compete with new companies and existing companies that move into the insurance and reinsurance markets. If competition, or technological or other changes to the insurance markets in which we operate, limits our ability to retain existing business or write new business at adequate rates or on appropriate terms, our business and results of operations could be materially and adversely affected. Increased competition could also result in fewer submissions, lower premium rates, and less favorable policy terms and conditions, which could reduce our profit margins and adversely impact our net income and shareholders' equity.

Recent technological advancements in the insurance industry and information technology industry present new and fast-evolving competitive risks as participants seek to increase transaction speeds, lower costs and create new opportunities. Advancements in technology are occurring in underwriting, claims, distribution and operations at a pace that may quicken, including as companies increase use of data analytics and technology as part of their business strategy. We will be at a competitive disadvantage if, over time, our competitors are more effective than us in their utilization of technology and evolving data analytics. If we do not anticipate or keep pace with these technological and other changes impacting the insurance industry, it could also limit our ability to compete in desired markets.

Insurance and reinsurance markets are historically cyclical, and we expect to experience periods with excess underwriting capacity and unfavorable premium rates.
The insurance and reinsurance markets have historically been cyclical, characterized by periods of intense price competition due to excessive underwriting capacity as well as periods when shortages of capacity permitted favorable premium levels. An increase in premium levels is often offset by an increasing supply of insurance and reinsurance capacity, either by capital provided by new entrants or by the commitment of additional capital by existing insurers or reinsurers, which may cause prices to decrease. Any of these factors could lead to a significant reduction in premium rates, less favorable policy terms, and fewer submissions for our underwriting services. In addition to these considerations, changes in the frequency and severity of losses

suffered by insureds and insurers may affect the cycles of the insurance and reinsurance markets significantly, as could periods of economic weakness (such as recession).

The integration of acquired companies may not be as successful as we anticipate.
Acquisitions involve numerous operational, strategic, financial, accounting, legal, tax, and other risks; potential liabilities associated with the acquired businesses; and uncertainties related to design, operation and integration of acquired businesses' internal controls over financial reporting. Difficulties in integrating an acquired company, along with its personnel, may result in the acquired company performing differently than we expected, in operational challenges or in our failure to realize anticipated expense-related efficiencies. This may also apply to companies in which we acquire majority ownership. Our existing businesses could also be negatively impacted by acquisitions. In addition, goodwill and intangible assets recorded in connection with insurance company acquisitions may be impaired if premium growth, underwriting profitability, agency retention and policy persistency, among other factors, differ from expectations.

There is also the potential that proposed acquisitions that have been publicly announced will not be consummated, even if a definitive agreement has been signed by the parties. If an agreement is terminated before closing, the result would be that our proposed acquisition would not occur, which could, among other things, expose us to damages or liability and adversely impact our stock price and future operations.

We may be subject to U.S. tax and Bermuda tax which may have an adverse effect on our results of operations and shareholder investment.
Chubb Limited and our non-U.S. subsidiaries operate in a manner so that none of these companies should be subject to U.S. tax (other than U.S. excise tax on insurance and reinsurance premium income attributable to insuring or reinsuring U.S. risks and U.S. withholding tax on some types of U.S. source investment income), because none of these companies should be treated as engaged in a trade or business within the U.S. However, because there is considerable uncertainty as to the activities that constitute being engaged in a trade or business within the U.S., we cannot be certain that the Internal Revenue Service (IRS) will not contend successfully that Chubb Limited or its non-U.S. subsidiaries are engaged in a trade or business in the U.S. If Chubb Limited or any of its non-U.S. subsidiaries were considered to be engaged in a trade or business in the U.S., such entity could be subject to U.S. corporate income and branch profits taxes on the portion of its earnings effectively connected to such U.S. business, in which case our results of operations and our shareholders' investments could be adversely affected.

The Bermuda Minister of Finance, under the Exempted Undertakings Tax Protection Act 1966 of Bermuda, as amended, has given Chubb Limited and its Bermuda insurance subsidiaries a written assurance that if any legislation is enacted in Bermuda that would impose tax computed on profits or income, or computed on any capital asset, gain, or appreciation, or any tax in the nature of estate duty or inheritance tax, then the imposition of any such tax would not be applicable to those companies or any of their respective operations, shares, debentures, or other obligations until March 31, 2035, except insofar as such tax would apply to persons ordinarily resident in Bermuda or is payable by us in respect of real property owned or leased by us in Bermuda. We cannot be certain that we will not be subject to any Bermuda tax after March 31, 2035.

We could be adversely affected by certain features of the 2017 U.S. tax reform legislation.
New tax legislation known as the Tax Cuts and Jobs Act (2017 Tax Act) was enacted in the U.S. on December 22, 2017. In addition to reducing the U.S. corporate income tax rate from 35 percent to 21 percent, it fundamentally changed many elements of the pre-2017 Tax Act U.S. tax law and introduced several new concepts to tax multinational corporations such as us. Among the most notable new rules are the Base Erosion and Anti-Abuse Tax (commonly called BEAT), which may apply as a result of payments by U.S. taxpayers to non-U.S. affiliates, and the Global Intangible Low Taxed Income (GILTI) addition to Subpart F income, which for insurance groups potentially expands U.S. taxation on the earnings of foreign subsidiaries. The 2017 Tax Act also included a one-time reduced-rate transition tax in 2017 on previously untaxed post-1986 earnings of foreign subsidiaries of U.S. corporations. The 2017 Tax Act, which was generally effective in 2018, is a complex law with many significant new provisions. During 2018 and 2019, the IRS and U.S. Treasury Department issued notices, proposed, and final regulations to assist taxpayers in understanding and implementing the new provisions. There may be changes between this guidance and final regulations to be issued in 2020. Thus, there are many uncertainties relating to its ultimate application and effects on our company.

The Organization for Economic Cooperation and Development (OECD) and the European Union (EU) are considering measures that might change long standing tax principles that could increase our taxes.
The OECD has published a framework for taxation that in many respects is different than long standing international tax principles. This framework is a proposal that we expect to develop further in 2020 as it is designed by the OECD Secretariat. This framework is an alternative to digital services taxes that several countries have enacted or are considering. These changes could redefine what income is taxed in which country and institute a global minimum tax. These proposals may be completed

by the end of 2020 which could be adopted by OECD countries in 2021 or later years. As countries unilaterally amend their tax laws to adopt certain parts of the OECD framework, this may increase the company's income taxes and cause uncertainties related to our income taxes.

The OECD has also published an action plan to address base erosion and profit shifting (BEPS) impacting its member countries and other jurisdictions. It is possible that jurisdictions in which we do business could continue to react to the BEPS initiative or their own concerns by enacting tax legislation that could adversely affect us or our shareholders.

Several multilateral organizations, including the EU and the OECD have, in recent years, expressed concern about some countries not participating in adequate tax information exchange arrangements and have threatened those that do not agree to cooperate with punitive sanctions by member countries. It is still unclear what all these sanctions might be, which countries might adopt them, and when or if they might be imposed. We cannot assure, however, that the Tax Information Exchange Agreements (TIEAs) that have been entered into by Switzerland and Bermuda will be sufficient to preclude all of the sanctions described above, which, if ultimately adopted, could adversely affect us or our shareholders.

Shareholders

There are provisions in our charter documents that may reduce the voting rights and diminish the value of our Common Shares.
Our Articles of Association generally provide that shareholders have one vote for each Common Share held by them and are entitled to vote at all meetings of shareholders. However, the voting rights exercisable by a shareholder may be limited so that certain persons or groups are not deemed to hold 10 percent or more of the voting power conferred by our Common Shares. Moreover, these provisions could have the effect of reducing the voting power of some shareholders who would not otherwise be subject to the limitation by virtue of their direct share ownership. The Board of Directors may refuse to register holders of shares as shareholders with voting rights based on certain grounds, including if the holder would, directly or indirectly, formally, constructively or beneficially own (as described in Articles 8 and 14 of our Articles of Association) or otherwise control voting rights with respect to 10 percent or more of the registered share capital recorded in the commercial register. In addition, the Board of Directors shall reject entry of holders of registered shares as shareholders with voting rights in the share register or shall decide on their deregistration when the acquirer or shareholder upon request does not expressly state that she/he has acquired or holds the shares in her/his own name and for her/his account.

Applicable laws may make it difficult to effect a change of control of our company.
Before a person can acquire control of a U.S. insurance company, prior written approval must be obtained from the insurance commissioner of the state where the domestic insurer is domiciled. Prior to granting approval of an application to acquire control of a domestic insurer, the state insurance commissioner will consider such factors as the financial strength of the applicant, the integrity and management of the applicant's Board of Directors and executive officers, the acquirer's plans for the future operations of the domestic insurer, and any anti-competitive results that may arise from the consummation of the acquisition of control. Generally, state statutes provide that control over a domestic insurer is presumed to exist if any person, directly or indirectly, owns, controls, holds with the power to vote, or holds proxies representing 10 percent or more of the voting securities of the domestic insurer. Because a person acquiring 10 percent or more of our Common Shares would indirectly control the same percentage of the stock of our U.S. insurance subsidiaries, the insurance change of control laws of various U.S. jurisdictions would likely apply to such a transaction. Laws of other jurisdictions in which one or more of our existing subsidiaries are, or a future subsidiary may be, organized or domiciled may contain similar restrictions on the acquisition of control of Chubb.

While our Articles of Association limit the voting power of any shareholder to less than 10 percent, we cannot assure that the applicable regulatory body would agree that a shareholder who owned 10 percent or more of our Common Shares did not, because of the limitation on the voting power of such shares, control the applicable insurance subsidiary.

These laws may discourage potential acquisition proposals and may delay, deter, or prevent a change of control of Chubb, including transactions that some or all of our shareholders might consider to be desirable.

Shareholder voting requirements under Swiss law may limit our flexibility with respect to certain aspects of capital management.
Swiss law allows our shareholders to authorize share capital which can be issued by the Board of Directors without shareholder approval but this authorization must be renewed by the shareholders every two years. Swiss law also does not provide as much flexibility in the various terms that can attach to different classes of stock as permitted in other jurisdictions. Swiss law also reserves for approval by shareholders many corporate actions over which the Board of Directors had authority prior to our re-

domestication to Switzerland. For example, dividends must be approved by shareholders. While we do not believe that Swiss law requirements relating to our capital management will have an adverse effect on Chubb, we cannot assure that situations will not arise where such flexibility would have provided substantial benefits to our shareholders.

Chubb Limited is a Swiss company; it may be difficult to enforce judgments against it or its directors and executive officers.
Chubb Limited is incorporated pursuant to the laws of Switzerland. In addition, certain of our directors and officers reside outside the U.S. and all or a substantial portion of our assets and the assets of such persons are located in jurisdictions outside the U.S. As such, it may be difficult or impossible to effect service of process within the U.S. upon those persons or to recover against us or them on judgments of U.S. courts, including judgments predicated upon civil liability provisions of the U.S. federal securities laws.

Chubb has been advised by its Swiss counsel that there is doubt as to whether the courts in Switzerland would enforce:
- judgments of U.S. courts based upon the civil liability provisions of the U.S. federal securities laws obtained in actions against it or its directors and officers, who reside outside the U.S.; or
- original actions brought in Switzerland against these persons or Chubb predicated solely upon U.S. federal securities laws.

Chubb has also been advised by its Swiss counsel that there is no treaty in effect between the U.S. and Switzerland providing for this enforcement and there are grounds upon which Swiss courts may not enforce judgments of U.S. courts. Some remedies available under the laws of U.S. jurisdictions, including some remedies available under the U.S. federal securities laws, would not be allowed in Swiss courts as contrary to that nation's public policy.

Shareholders may be subject to Swiss withholding taxes on the payment of dividends.
Our dividends are generally subject to a Swiss withholding tax at a rate of 35 percent; however, payment of a dividend in the form of a par value reduction or qualifying capital contribution reserve reduction is not subject to Swiss withholding tax. We have previously obtained shareholder approval for dividends to be paid in such form. We currently intend to recommend to shareholders that they annually approve the payment of dividends in such form but we cannot assure that our shareholders will continue to approve a reduction in such form each year or that we will be able to meet the other legal requirements for a reduction in par value, or that Swiss withholding tax rules will not be changed in the future. We estimate we would be able to pay dividends in such form, and thus exempt from Swiss withholding tax until 2028–2033. This range may vary depending upon changes in annual dividends, special dividends, certain share repurchases, fluctuations in U.S. dollar/Swiss franc exchange rate, changes in par value or qualifying capital contribution reserves or changes or new interpretations to Swiss corporate or tax law or regulations.

Under certain circumstances, U.S. shareholders may be subject to adverse U.S. federal income tax consequences.
Under certain circumstances, a U.S. person who owns or is deemed to own 10 percent or more of the voting power or value of a foreign corporation that is a “controlled foreign corporation” (CFC) (a foreign corporation in which 10 percent U.S. shareholders own or are deemed to own more than 50 percent of the voting power or value of the stock of a foreign corporation or more than 25 percent of certain foreign insurance corporations) for any period during a taxable year must include in gross income for U.S. federal income tax purposes a pro rata share of the CFC's "subpart F income". We believe that because of the dispersion of our share ownership it is unlikely that any U.S. person who acquires shares of Chubb Limited directly or indirectly through one or more foreign entities should be required to include any subpart F income in income under the CFC rules of U.S. tax law.

Separately, any U.S. persons who hold shares may be subject to U.S. federal income taxation at ordinary income tax rates on their proportionate share of our Related Person Insurance Income (RPII). If the RPII of any of our non-U.S. insurance subsidiaries (each a "Non-U.S. Insurance Subsidiary") were to equal or exceed 20 percent of that company's gross insurance income in any taxable year and direct or indirect insureds (and persons related to those insureds) own directly or indirectly through foreign entities 20 percent or more of the voting power or value of Chubb Limited, then a U.S. person who owns any shares of Chubb Limited (directly or indirectly through foreign entities) on the last day of the taxable year would be required to include in his or her income for U.S. federal income tax purposes such person's pro rata share of such company's RPII for the taxable year. In addition, any RPII that is includible in the income of a U.S. tax-exempt organization may be treated as unrelated business taxable income. We believe that the gross RPII of each Non-U.S. Insurance Subsidiary did not in prior years of operation and is not expected in the foreseeable future to equal or exceed 20 percent of each such company's gross insurance income. Likewise, we do not expect the direct or indirect insureds of each Non-U.S. Insurance Subsidiary (and persons related to such insureds) to directly or indirectly own 20 percent or more of either the voting power or value of our shares. However, we cannot be certain that this will be the case because some of the factors which determine the extent of RPII may be beyond our control. If these thresholds are met or exceeded, any U.S. person’s investment in Chubb Limited could be adversely affected.

A U.S. tax-exempt organization may recognize unrelated business taxable income if a portion of our insurance income is allocated to the organization. This generally would be the case if either (i) Chubb Limited is considered a CFC and the tax-exempt shareholder is a 10 percent U.S. shareholder or (ii) there is RPII, certain exceptions do not apply, and the tax-exempt organization, directly (or indirectly through foreign entities) owns any shares of Chubb Limited. Although we do not believe that any U.S. tax-exempt organization should be allocated such insurance income, we cannot be certain that this will be the case. Potential U.S. tax-exempt investors are advised to consult their tax advisors.

U.S. persons who hold shares will be subject to adverse tax consequences if we are considered to be a Passive Foreign Investment Company (PFIC) for U.S. federal income tax purposes.
If Chubb Limited is considered a PFIC for U.S. federal income tax purposes, a U.S. person who holds Chubb Limited shares will be subject to adverse U.S. federal income tax consequences in which case their investment could be adversely affected. In addition, if Chubb Limited were considered a PFIC, upon the death of any U.S. individual owning shares, such individual's heirs or estate would not be entitled to a "step-up" in the basis of the shares which might otherwise be available under U.S. federal income tax laws. We believe that we are not, have not been, and currently do not expect to become, a PFIC for U.S. federal income tax purposes. We cannot assure, however, that we will not be deemed a PFIC by the IRS. Recently enacted U.S. federal tax law and recently proposed regulations issued by the IRS and U.S. Treasury Department contain new rules that may affect the application of the PFIC provisions to an insurance company. Final regulations or pronouncements interpreting or clarifying these rules may be forthcoming. We cannot predict what impact, if any, such guidance would have on an investor that is subject to U.S. federal income taxation. Any shareholder electing to apply the newly proposed PFIC regulations could be adversely affected by an investment in us. Shareholders are advised to consult their tax advisors.

ITEM 1B. Unresolved Staff Comments
There are currently no unresolved SEC staff comments regarding our periodic or current reports.

ITEM 2. Properties
We maintain office facilities around the world including in North America, Europe (including our principal executive offices in Switzerland), Bermuda, Latin America, Asia Pacific, and the Far East. Most of our office facilities are leased, although we own major facilities in Hamilton, Bermuda, and in the U.S., including in Philadelphia, Pennsylvania; Wilmington, Delaware; Whitehouse Station, New Jersey; and Simsbury, Connecticut. Management considers its office facilities suitable and adequate for the current level of operations.

ITEM 3. Legal Proceedings
The information required with respect to Item 3 is included in Note 10 h) to the Consolidated Financial Statements, which is hereby incorporated herein by reference.

ITEM 4. Mine Safety Disclosures
Item not applicable.

PART II

ITEM 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Our Common Shares have been listed on the New York Stock Exchange since March 25, 1993, with a current par value of CHF 24.15 per share. The trading symbol for our Common Shares is "CB."

We have paid dividends each quarter since we became a public company in 1993. In 2019 and 2018, our annual dividends were paid by way of a distribution from capital contribution reserves (Additional paid-in capital) through the transfer of dividends from Additional paid-in capital to Retained earnings (free reserves) as approved by our shareholders.

Chubb Limited is a holding company whose principal sources of income are dividends and investment income from its operating subsidiaries. The ability of the operating subsidiaries to pay dividends to us and our ability to pay dividends to our shareholders are each subject to legal and regulatory restrictions. The recommendation and payment of future dividends will be based on the determination of the Board of Directors (Board) and will be dependent upon shareholder approval, profits and financial requirements of Chubb and other factors, including legal restrictions on the payment of dividends and other such factors as the Board deems relevant. Refer to Part I, Item 1A and Part II, Item 7 for additional information.

The number of record holders of Common Shares as of February 13, 2020 was 6,902. This is not the actual number of beneficial owners of Chubb's Common Shares since most of our shareholders hold their shares through a stockbroker, bank or other nominee rather than directly in their own names.

Refer to Part III, Item 12 for information relating to compensation plans under which equity securities are authorized for issuance.

Issuer's Repurchases of Equity Securities for the Three Months Ended December 31, 2019

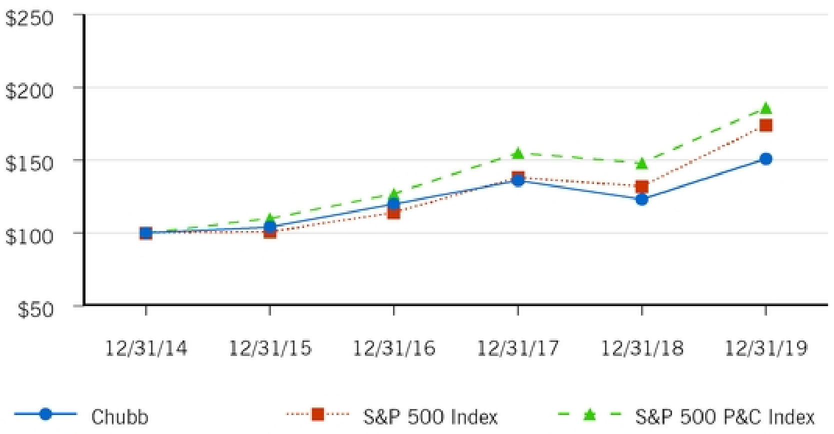
Period	Total Number of Shares Purchased (1)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans (2)	Approximate Dollar Value of Shares that May Yet be Purchased Under Publicly Announced Plans (3)
October 1 through October 31	703,138	$ 153.65	700,900	$ 151 million
November 1 through November 30	677,640	$ 151.41	670,000	$ 1.55 billion
December 1 through December 31	654,352	$ 153.84	653,500	$ 1.45 billion
Total	2,035,130	$ 152.97	2,024,400	

(1) This represents open market share repurchases and the surrender to Chubb of Common Shares to satisfy tax withholding obligations in connection with the vesting of restricted stock issued to employees and the exercise of options by employees.

(2) The aggregate value of shares purchased in the three months ended December 31, 2019 as part of the publicly announced plans was $310 million.

(3) Refer to Note 11 to the Consolidated Financial Statements for more information on the Chubb Limited securities repurchase authorizations. In November 2019, the Board authorized the repurchase of up to $1.5 billion of Chubb's Common Shares from November 21, 2019 through December 31, 2020. The $1.5 billion December 2018 Board authorization remained effective through December 31, 2019, and was used in advance of the $1.5 billion share repurchase authorized in November 2019. For the period January 1, 2020 through February 26, 2020, we repurchased 947,400 Common Shares for a total of $151 million in a series of open market transactions. As of February 26, 2020, $1.30 billion in share repurchase authorization remained through December 31, 2020.

Performance Graph
Set forth below is a line graph comparing the dollar change in the cumulative total shareholder return on Chubb's Common Shares from December 31, 2014, through December 31, 2019, as compared to the cumulative total return of the Standard & Poor's 500 Stock Index and the cumulative total return of the Standard & Poor's Property-Casualty Insurance Index. The cumulative total shareholder return is a concept used to compare the performance of a company's stock over time and is the ratio of the stock price change plus the cumulative amount of dividends over the specified time period (assuming dividend reinvestment), to the stock price at the beginning of the time period. The chart depicts the value on December 31, 2015, 2016, 2017, 2018, and 2019, of a $100 investment made on December 31, 2014, with all dividends reinvested.



	12/31/2014	12/31/2015	12/31/2016	12/31/2017	12/31/2018	12/31/2019
Chubb Limited	$100	$104	$120	$136	$123	$151
S&P 500 Index	$100	$101	$114	$138	$132	$174
S&P 500 P&C Index	$100	$110	$127	$155	$148	$186

ITEM 6. Selected Financial Data

On January 14, 2016, we completed the acquisition of The Chubb Corporation (Chubb Corp). The results of operations of Chubb Corp are included in our results from the acquisition date forward (i.e., after January 14, 2016 and only in the 2016, 2017, 2018 and 2019 columns) within the table below.

(in millions of U.S. dollars, except per share data and ratios)	2019	2018	2017	2016	2015
Operations data:					
Net premiums earned – excluding Life Insurance segment	**$ 28,947**	$ 27,846	$ 26,933	$ 26,694	$ 15,266
Net premiums earned – Life Insurance segment	**2,343**	2,218	2,101	2,055	1,947
Total net premiums earned	**31,290**	30,064	29,034	28,749	17,213
Net investment income	**3,426**	3,305	3,125	2,865	2,194
Losses and loss expenses	**18,730**	18,067	18,454	16,052	9,484
Policy benefits	**740**	590	676	588	543
Policy acquisition costs and administrative expenses	**9,183**	8,798	8,614	8,985	5,211
Net income	**4,454**	3,962	3,861	4,135	2,834
Weighted-average shares outstanding – diluted	**459**	467	471	466	329
Diluted earnings per share	**$ 9.71**	$ 8.49	$ 8.19	$ 8.87	$ 8.62
Balance sheet data (at end of period):					
Total investments	**$ 109,234**	$ 100,968	$ 102,444	$ 99,094	$ 66,251
Total assets	**176,943**	167,771	167,022	159,786	102,306
Net unpaid losses and loss expenses	**48,509**	48,271	49,165	47,832	26,562
Net future policy benefits	**5,617**	5,304	5,137	4,854	4,620
Long-term debt	**13,559**	12,087	11,556	12,610	9,389
Trust preferred securities	**308**	308	308	308	307
Total liabilities	**121,612**	117,459	115,850	111,511	73,171
Shareholders' equity	**55,331**	50,312	51,172	48,275	29,135
Book value per share	**$ 122.42**	$ 109.56	$ 110.32	$ 103.60	$ 89.77
Selected data:					
Loss and loss expense ratio (1)	**62.1%**	62.1%	65.8%	57.7%	58.1%
Underwriting and administrative expense ratio (2)	**28.5%**	28.5%	28.9%	30.6%	29.2%
Combined ratio (3)	**90.6%**	90.6%	94.7%	88.3%	87.3%
Cash dividends per share	**$ 2.98**	$ 2.90	$ 2.82	$ 2.74	$ 2.66

(1) The Loss and loss expense ratio is calculated by dividing losses and loss expenses, excluding the Life Insurance segment, by Net premiums earned – excluding Life Insurance segment. Losses and loss expenses for the Life Insurance segment were $757 million, $766 million, $739 million, $663 million, and $601 million for the years ended December 31, 2019, 2018, 2017, 2016, and 2015, respectively.

(2) The Underwriting and administrative expense ratio is calculated by dividing the policy acquisition costs and administrative expenses, excluding the Life Insurance segment, by Net premiums earned – excluding Life Insurance segment. Policy acquisition costs and administrative expenses for the Life Insurance segment were $943 million, $867 million, $833 million, $816 million, and $767 million for the years ended December 31, 2019, 2018, 2017, 2016, and 2015, respectively.

(3) The combined ratio is the sum of Loss and loss expense ratio and the Underwriting and administrative expense ratio.

ITEM 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following is a discussion of our results of operations, financial condition, and liquidity and capital resources as of and for the year ended December 31, 2019. This discussion should be read in conjunction with the consolidated financial statements and related Notes, under Item 8 of this Form 10-K.

All comparisons in this discussion are to the corresponding prior year unless otherwise indicated. All dollar amounts are rounded. However, percent changes and ratios are calculated using whole dollars. Accordingly, calculations using rounded dollars may differ.

Forward-Looking Statements

The Private Securities Litigation Reform Act of 1995 provides a "safe harbor" for forward-looking statements. Any written or oral statements made by us or on our behalf may include forward-looking statements that reflect our current views with respect to future events and financial performance. These forward-looking statements are subject to certain risks, uncertainties, and other factors that could, should potential events occur, cause actual results to differ materially from such statements. These risks, uncertainties, and other factors, which are described in more detail under Part I, Item 1A, under Risk Factors, starting on page 19 and elsewhere herein and in other documents we file with the U.S. Securities and Exchange Commission (SEC), include but are not limited to:

- losses arising out of natural or man-made catastrophes such as hurricanes, typhoons, earthquakes, floods, climate change (including effects on weather patterns; greenhouse gases; sea, land and air temperatures; sea levels; and rain and snow), nuclear accidents, or terrorism which could be affected by:
    - the number of insureds and ceding companies affected;
    - the amount and timing of losses actually incurred and reported by insureds;
    - the impact of these losses on our reinsurers and the amount and timing of reinsurance recoverable actually received;
    - the cost of building materials and labor to reconstruct properties or to perform environmental remediation following a catastrophic event; and
    - complex coverage and regulatory issues such as whether losses occurred from storm surge or flooding and related lawsuits;
- actions that rating agencies may take from time to time, such as financial strength or credit ratings downgrades or placing these ratings on credit watch negative or the equivalent;
- the ability to collect reinsurance recoverable, credit developments of reinsurers, and any delays with respect thereto and changes in the cost, quality, or availability of reinsurance;
- actual loss experience from insured or reinsured events and the timing of claim payments;
- the uncertainties of the loss-reserving and claims-settlement processes, including the difficulties associated with assessing environmental damage and asbestos-related latent injuries, the impact of aggregate-policy-coverage limits, the impact of bankruptcy protection sought by various asbestos producers and other related businesses, and the timing of loss payments;
- changes to our assessment as to whether it is more likely than not that we will be required to sell, or have the intent to sell, available for sale fixed maturity investments before their anticipated recovery;
- infection rates and severity of pandemics and their effects on our business operations and claims activity;
- developments in global financial markets, including changes in interest rates, stock markets, and other financial markets, increased government involvement or intervention in the financial services industry, the cost and availability of financing, and foreign currency exchange rate fluctuations (which we refer to in this report as foreign exchange and foreign currency exchange), which could affect our statement of operations, investment portfolio, financial condition, and financing plans;
- general economic and business conditions resulting from volatility in the stock and credit markets and the depth and duration of potential recession;
- global political conditions, the occurrence of any terrorist attacks, including any nuclear, radiological, biological, or chemical events, or the outbreak and effects of war, and possible business disruption or economic contraction that may result from such events;
- the potential impact of the United Kingdom's vote to withdraw from the European Union, including political, regulatory, social, and economic uncertainty and market and exchange rate volatility;
- judicial decisions and rulings, new theories of liability, legal tactics, and settlement terms;

- the effects of public company bankruptcies and/or accounting restatements, as well as disclosures by and investigations of public companies relating to possible accounting irregularities, and other corporate governance issues, including the effects of such events on:
  - the capital markets;
  - the markets for directors and officers (D&O) and errors and omissions (E&O) insurance; and
  - claims and litigation arising out of such disclosures or practices by other companies;
- uncertainties relating to governmental, legislative and regulatory policies, developments, actions, investigations, and treaties, which, among other things, could subject us to insurance regulation or taxation in additional jurisdictions or affect our current operations;
- the effects of data privacy or cyber laws or regulation on our current or future business;
- the actual amount of new and renewal business, market acceptance of our products, and risks associated with the introduction of new products and services and entering new markets, including regulatory constraints on exit strategies;
- the competitive environment in which we operate, including trends in pricing or in policy terms and conditions, which may differ from our projections and changes in market conditions that could render our business strategies ineffective or obsolete;
- acquisitions made by us performing differently than expected, our failure to realize anticipated expense-related efficiencies or growth from acquisitions, the impact of acquisitions on our pre-existing organization, or announced acquisitions not closing;
- risks and uncertainties relating to our planned purchases of additional interests in Huatai Insurance Group Company Limited (Huatai Group), including our ability to receive Chinese insurance regulatory approval and complete the purchases;
- risks associated with being a Swiss corporation, including reduced flexibility with respect to certain aspects of capital management and the potential for additional regulatory burdens;
- the potential impact from government-mandated insurance coverage for acts of terrorism;
- the availability of borrowings and letters of credit under our credit facilities;
- the adequacy of collateral supporting funded high deductible programs;
- changes in the distribution or placement of risks due to increased consolidation of insurance and reinsurance brokers;
- material differences between actual and expected assessments for guaranty funds and mandatory pooling arrangements;
- the effects of investigations into market practices in the property and casualty (P&C) industry;
- changing rates of inflation and other economic conditions, for example, recession;
- the amount of dividends received from subsidiaries;
- loss of the services of any of our executive officers without suitable replacements being recruited in a reasonable time frame;
- the ability of our technology resources, including information systems and security, to perform as anticipated such as with respect to preventing material information technology failures or third-party infiltrations or hacking resulting in consequences adverse to Chubb or its customers or partners;
- the ability of our company to increase use of data analytics and technology as part of our business strategy and adapt to new technologies; and
- management's response to these factors and actual events (including, but not limited to, those described above).

The words "believe," "anticipate," "estimate," "project," "should," "plan," "expect," "intend," "hope," "feel," "foresee," "will likely result," or "will continue," and variations thereof and similar expressions, identify forward-looking statements. You are cautioned not to place undue reliance on these forward-looking statements, which speak only as of their dates. We undertake no obligation to publicly update or review any forward-looking statements, whether as a result of new information, future events or otherwise.

Overview

We operate through six business segments: North America Commercial P&C Insurance, North America Personal P&C Insurance, North America Agricultural Insurance, Overseas General Insurance, Global Reinsurance, and Life Insurance. For more information on our segments refer to “Segment Information” under Item 1.

We have grown our business through increased premium volume, expansion of product offerings and geographic reach, and acquisitions of other companies.

Our product and geographic diversification differentiates us from the vast majority of our competitors and has been a source of stability during periods of industry volatility. Our long-term business strategy focuses on sustained growth in book value achieved through a combination of underwriting and investment income. By doing so, we provide value to our clients and shareholders through use of our substantial capital base in the insurance and reinsurance markets.

We are organized along a profit center structure by line of business and territory that does not necessarily correspond to corporate legal entities. Profit centers can access various legal entities subject to licensing and other regulatory rules. Profit centers are expected to generate underwriting income and appropriate risk-adjusted returns. Our corporate structure has facilitated the development of management talent by giving each profit center's senior management team the necessary autonomy within underwriting authorities to make operating decisions and create products and coverages needed by its target customer base. We are focused on delivering underwriting profit by only writing policies which we believe adequately compensate us for the risk we accept.

Our insurance and reinsurance operations generate gross revenues from two principal sources: premiums and investment income. Cash flow is generated from premiums collected and investment income received less paid losses and loss expenses, policy acquisition costs, and administrative expenses. Invested assets are substantially held in liquid, investment grade fixed income securities of relatively short duration. Claims payments in any short-term period are highly unpredictable due to the random nature of loss events and the timing of claims awards or settlements. The value of investments held to pay future claims is subject to market forces such as the level of interest rates, stock market volatility, and credit events such as corporate defaults. The actual cost of claims is also volatile based on loss trends, inflation rates, court awards, and catastrophes. We believe that our cash balance, our highly liquid investments, credit facilities, and reinsurance protection provide sufficient liquidity to meet unforeseen claim demands that might occur in the year ahead. Refer to “Liquidity” and “Capital Resources” for additional information.

Financial Highlights for the Year Ended December 31, 2019

- Net income was $4,454 million compared with $3,962 million in 2018.
- Net premiums written were $32.3 billion, up 5.5 percent, or 7.0 percent on a constant-dollar basis.
- The North America Agricultural Insurance segment combined ratio was 95.1 percent compared with 75.5 percent in 2018, or a decline of $296 million in underwriting income, principally due to the downward revision in the 2019 crop year margin estimate reflecting preventive planting claims due to the impact of wet weather conditions and crop yield shortfalls resulting from poor growing conditions.
- P&C combined ratio was 90.6 percent in both 2019 and 2018. P&C current accident year combined ratio excluding catastrophe losses was 89.2 percent compared with 88.0 percent in 2018, reflecting the increase in the North America Agricultural Insurance segment combined ratio noted above.
- Total pre-tax and after-tax catastrophe losses, including reinstatement premiums, were $1,187 million (4.1 percentage points of the combined ratio) and $966 million, respectively, compared with $1,626 million (5.9 percentage points of the combined ratio) and $1,354 million, respectively, in 2018. Refer to the Consolidated Operating Results section for additional information on our catastrophe losses.
- Total pre-tax and after-tax favorable prior period development were $792 million (2.7 percentage points of the combined ratio) and $624 million, respectively, compared with $896 million (3.3 percentage points of the combined ratio) and $706 million, respectively, in 2018. Pre-tax favorable prior period development in 2018 included favorable reinsurance settlements of $205 million related to legacy run-off exposures.

- Operating cash flow was $6,342 million compared with $5,480 million in 2018, an increase of $862 million primarily due to higher underwriting cash flow. Refer to the Liquidity section for additional information on our cash flows.
- Net investment income was $3,426 million compared with $3,305 million in 2018.
- Share repurchases totaled $1,531 million, or approximately 10.4 million shares for the year, at an average purchase price of $146.61 per share.

Outlook

We completed 2019 with net premiums written growth of 5.5 percent, or 7.0 percent on a constant-dollar basis. Premium growth accelerated globally with the current pricing and underwriting environment, which has continued to improve in more lines of business and more territories. We plan to use our global presence to capitalize on these market conditions in the year ahead, while continuing to focus on our long-term strategic growth initiatives.

Our net investment income increased 3.6 percent in 2019, reflecting strong operating cash flow and a higher invested asset base. There are several factors that impact the variability in investment income, including interest rates and private equity distributions. Nevertheless, we expect our quarterly pre-tax net investment income in 2020 to be in the range of $852 million to $862 million, including the expected amortization of the fair value adjustment on acquired invested assets, at current exchange rates, of approximately $33 million per quarter. Excluding the amortization of the fair value adjustment on acquired invested assets, we expect quarterly pre-tax adjusted net investment income in 2020 to be in the range of $885 million to $895 million. The estimate of amortization expense of the fair value adjustment on acquired invested assets could vary materially based on current market conditions, bond calls, overall duration of the acquired investment portfolio, and foreign exchange.

During 2019, Chubb increased its ownership interest in Huatai Group and is committed to acquire additional interests with the goal of majority and beyond ownership. To that end, Chubb entered into agreements to purchase an additional 22.4 percent ownership in Huatai Group through separate purchases of 15.3 percent and 7.1 percent, respectively, each contingent upon regulatory approvals and other important conditions. At the completion of the 7.1 percent purchase, which is expected by the end of 2021, Chubb is expected to apply consolidation accounting.

Critical Accounting Estimates

Our consolidated financial statements include amounts that, either by their nature or due to requirements of generally accepted accounting principles in the U.S. (GAAP), are determined using best estimates and assumptions. While we believe that the amounts included in our consolidated financial statements reflect our best judgment, actual amounts could ultimately materially differ from those currently presented. We believe the items that require the most subjective and complex estimates are:

- unpaid loss and loss expense reserves, including long-tail asbestos and environmental (A&E) reserves and non-A&E casualty exposures;
- future policy benefits reserves;
- the valuation of value of business acquired (VOBA) and amortization of deferred policy acquisition costs and VOBA;
- the assessment of risk transfer for certain structured insurance and reinsurance contracts;
- reinsurance recoverable, including a provision for uncollectible reinsurance;
- the valuation of our investment portfolio and assessment of other-than-temporary impairments (OTTI);
- the valuation of deferred income taxes;
- the valuation of derivative instruments related to guaranteed living benefits (GLB); and
- the assessment of goodwill for impairment.

We believe our accounting policies for these items are of critical importance to our consolidated financial statements. The following discussion provides more information regarding the estimates and assumptions required to arrive at these amounts and should be read in conjunction with the sections entitled: Prior Period Development, Asbestos and Environmental (A&E), Reinsurance Recoverable on Ceded Reinsurance, Investments, Net Realized and Unrealized Gains (Losses), and Other Income and Expense Items.

Unpaid losses and loss expenses
As an insurance and reinsurance company, we are required by applicable laws and regulations and GAAP to establish loss and loss expense reserves for the estimated unpaid portion of the ultimate liability for losses and loss expenses under the terms of our policies and agreements with our insured and reinsured customers. At December 31, 2019, our gross unpaid loss and loss expense reserves were $62.7 billion and our net unpaid loss and loss expense reserves were $48.5 billion. With the exception of certain structured settlements, for which the timing and amount of future claim payments are reliably determinable, and certain reserves for unsettled claims, our loss reserves are not discounted for the time value of money. In connection with such structured settlements and certain reserves for unsettled claims, we carried net discounted reserves of $74 million and $73 million at December 31, 2019 and 2018, respectively.

The following table presents a roll-forward of our unpaid losses and loss expenses:

	December 31, 2019			December 31, 2018		
(in millions of U.S. dollars)	**Gross Losses**	**Reinsurance Recoverable(1)**	**Net Losses**	Gross Losses	Reinsurance Recoverable(1)	Net Losses
Balance, beginning of year	**$ 62,960**	**$ 14,689**	**$ 48,271**	$ 63,179	$ 14,014	$ 49,165
Losses and loss expenses incurred	**23,657**	**4,927**	**18,730**	23,645	5,578	18,067
Losses and loss expenses paid	**(23,911)**	**(5,438)**	**(18,473)**	(23,079)	(4,739)	(18,340)
Other (including foreign exchange translation)	**(16)**	**3**	**(19)**	(785)	(164)	(621)
Balance, end of year	**$ 62,690**	**$ 14,181**	**$ 48,509**	$ 62,960	$ 14,689	$ 48,271

(1) Net of provision for uncollectible reinsurance.

The estimate of the liabilities includes provisions for claims that have been reported but are unpaid at the balance sheet date (case reserves) and for obligations on claims that have been incurred but not reported (IBNR) at the balance sheet date. IBNR may also include provisions to account for the possibility that reported claims may settle for amounts that differ from the established case reserves. Loss reserves also include an estimate of expenses associated with processing and settling unpaid claims (loss expenses). Our loss reserves comprise approximately 80 percent casualty-related business, which typically encompasses long-tail risks, and other risks where a high degree of judgment is required.

The process of establishing loss reserves for property and casualty claims can be complex and is subject to considerable uncertainty as it requires the use of informed estimates and judgments based on circumstances underlying the insured losses known at the date of accrual. For example, the reserves established for high excess casualty claims, asbestos and environmental claims, claims from major catastrophic events, or for our various product lines each require different assumptions and judgments to be made. Necessary judgments are based on numerous factors and may be revised as additional experience and other data become available and are reviewed, as new or improved methods are developed, or as laws change. Hence, ultimate loss payments may differ from the estimate of the ultimate liabilities made at the balance sheet date. Changes to our previous estimates of prior period loss reserves impact the reported calendar year underwriting results adversely if our estimates increase or favorably if our estimates decrease. The potential for variation in loss reserve estimates is impacted by numerous factors. Reserve estimates for casualty lines are particularly uncertain given the lengthy reporting patterns and corresponding need for IBNR.

Case reserves for those claims reported by insureds or ceding companies to us prior to the balance sheet date and where we have sufficient information are determined by our claims personnel as appropriate based on the circumstances of the claim(s), standard claim handling practices, and professional judgment. Furthermore, for our Brandywine run-off operations and our
assumed reinsurance operation, Global Reinsurance, we may adjust the case reserves as notified by the ceding company if the judgment of our respective claims department differs from that of the cedant.

With respect to IBNR reserves and those claims that have been incurred but not reported prior to the balance sheet date, there is, by definition, limited actual information to form the case reserve estimate and reliance is placed upon historical loss experience and actuarial methods to estimate the ultimate loss obligations and the corresponding amount of IBNR. IBNR reserve estimates are generally calculated by first projecting the ultimate amount of losses for a product line and subtracting paid losses and case reserves for reported claims. The judgments involved in projecting the ultimate losses may pertain to the use and interpretation of various standard actuarial reserving methods that place reliance on the extrapolation of actual historical data, loss development patterns, industry data, and other benchmarks as appropriate. The estimate of the required IBNR reserve also requires judgment by actuaries and management to reflect the impact of more contemporary and subjective factors, both qualitative and quantitative. Among some of these factors that might be considered are changes in business mix or volume, changes in ceded reinsurance structures, changes in claims handling practices, reported and projected loss trends, inflation, the legal environment, and the terms and conditions of the contracts sold to our insured parties.

Determining management's best estimate
Our recorded reserves represent management's best estimate of the provision for unpaid claims as of the balance sheet date, and establishing them involves a process that includes collaboration with various relevant parties in the company. For information on our reserving process, refer to Note 7 to the Consolidated Financial Statements.

Sensitivity to underlying assumptions
While we believe that our reserve for unpaid losses and loss expenses at December 31, 2019, is adequate, new information or emerging trends that differ from our assumptions may lead to future development of losses and loss expenses that is significantly greater or less than the recorded reserve, which could have a material effect on future operating results. As noted previously, our best estimate of required loss reserves for most portfolios is judgmentally selected for each origin year after considering the results from a number of reserving methods and is not a purely mechanical process. Therefore, it is difficult to convey, in a simple and quantitative manner, the impact that a change to a single assumption will have on our best estimate. In the examples below, we attempt to give an indication of the potential impact by isolating a single change for a specific reserving method that would be pertinent in establishing the best estimate for the product line described. We consider each of the following sensitivity analyses to represent a reasonably likely deviation in the underlying assumption.

North America Commercial P&C Insurance
Given the long reporting and paid development patterns for workers' compensation business, the development factors used to project actual current losses to ultimate losses for our current exposure require considerable judgment that could be material to consolidated loss and loss expense reserves. Specifically, adjusting ground up ultimate losses by a one percent change in the tail factor (i.e., 1.04 changed to either 1.05 or 1.03) would cause a change of approximately $823 million, either positive or negative, for the projected net loss and loss expense reserves. This represents an impact of about 8.8 percent relative to recorded net loss and loss expense reserves of approximately $9.4 billion.

The reserve portfolio for our Chubb Bermuda operations contains exposure to predominantly high excess liability coverage on an occurrence-first-reported basis (typically with attachment points in excess of $325 million and gross limits of up to $150 million) and D&O and other professional liability coverage on a claims-made basis (typically with attachment points in excess of $125 million and gross limits of up to $75 million). Due to the layer of exposure covered, the expected frequency for this book is very low. As a result of the low frequency/high severity nature of the book, a small difference in the actual vs. expected claim frequency, either positive or negative, could result in a material change to the projected ultimate loss if such change in claim frequency was related to a policy where close to maximum limits were deployed.

North America Personal P&C Insurance
Due to the relatively short-tailed nature of many of the coverages involved (e.g., homeowners property damage), most of the incurred losses in Personal Lines are resolved within a few years of occurrence. As shown in our loss triangle disclosure, the vast majority (over 95 percent) of Personal Lines net ultimate losses and allocated loss adjustment expenses are typically paid within five years of the accident date and over 80 percent within two years. Even though there are significant reserves associated with some liability exposures such as personal excess/umbrella liability, our incurred loss triangle also shows a roughly consistent pattern of only relatively minor movements in incurred estimates over time by accident year especially after twenty-four months of maturity. While the liability exposures are subject to additional uncertainties from more protracted resolution times, the main drivers of volatility in the Personal Lines business are relatively short-term in nature and relate to things like natural catastrophes, non-catastrophe weather events, man-made risks, and individual large loss volatility from other fortuitous claim events.

North America Agricultural Insurance
Approximately 66 percent of the reserves for this segment are from the crop related lines, which all have short payout patterns, with the majority of the liabilities expected to be resolved in the ensuing twelve months. Claim reserves for our Multiple Peril Crop Insurance (MPCI) product are set on a case-by-case basis and our aggregate exposure is subject to state level risk sharing formulae as well as third-party reinsurance. The majority of the development risk arises out of the accuracy of case reserve estimates and the time needed for final crop conditions to be assessed. We do not view our Agriculture reserves as substantially influenced by the general assumptions and risks underlying more typical P&C reserve estimates.

Overseas General Insurance
Certain long-tail lines, such as casualty and professional lines, are particularly susceptible to changes in loss trend and claim inflation. Heightened perceptions of tort and settlement awards around the world can increase the demand for these products as well as contributing to the uncertainty in the reserving estimates. Our reserving methods rely on loss development patterns estimated from historical data and while we attempt to adjust such factors for known changes in the current tort environment, it is possible that such factors may not entirely reflect all recent trends in tort environments. For example, when applying the reported loss development method, the lengthening of our selected loss development patterns by six months would increase reserve estimates on long-tail casualty and professional lines for accident years 2017 and prior by approximately $525 million. This represents an impact of 14.4 percent relative to recorded net loss and loss expense reserves of approximately $3.6 billion.

Global Reinsurance
Typically, there is inherent uncertainty around the length of paid and reported development patterns, especially for certain casualty lines such as excess workers' compensation or general liability, which may take decades to fully develop. This uncertainty is accentuated by the need to supplement client development patterns with industry development patterns due to the sometimes low statistical credibility of the data. The underlying source and selection of the final development patterns can thus have a significant impact on the selected ultimate net losses and loss expenses. For example, a 20 percent shortening or lengthening of the development patterns used for U.S. long-tail lines would cause the loss reserve estimate derived by the reported Bornhuetter-Ferguson method for these lines to change by approximately $285 million. This represents an impact of 43 percent relative to recorded net loss and loss expense reserves of approximately $670 million.

Assumed reinsurance
At December 31, 2019, net unpaid losses and loss expenses for the Global Reinsurance segment aggregated to $1.4 billion, consisting of $769 million of case reserves and $664 million of IBNR. In comparison, at December 31, 2018, net unpaid losses and loss expenses for the Global Reinsurance segment aggregated to $1.6 billion, consisting of $807 million of case reserves and $807 million of IBNR.

For our catastrophe business, we principally estimate unpaid losses and loss expenses on an event basis by considering various sources of information, including specific loss estimates reported by our cedants, ceding company and overall industry loss estimates reported by our brokers, and our internal data regarding reinsured exposures related to the geographical location of the event. Our internal data analysis enables us to establish catastrophe reserves for known events with more certainty at an earlier date than would be the case if we solely relied on reports from third parties to determine carried reserves.

For our casualty reinsurance business, we generally rely on ceding companies to report claims and then use that data as a key input to estimate unpaid losses and loss expenses. Due to the reliance on claims information reported by ceding companies, as well as other factors, the estimation of unpaid losses and loss expenses for assumed reinsurance includes certain risks and uncertainties that are unique relative to our direct insurance business. These include, but are not necessarily limited to, the following:

- The reported claims information could be inaccurate;
- Typically, a lag exists between the reporting of a loss event to a ceding company and its reporting to us as a reinsurance claim. The use of a broker to transmit financial information from a ceding company to us increases the reporting lag. Because most of our reinsurance business is produced by brokers, ceding companies generally first submit claim and other financial information to brokers, who then report the proportionate share of such information to each reinsurer of a particular treaty. The reporting lag generally results in a longer period of time between the date a claim is incurred and the date a claim is reported compared with direct insurance operations. Therefore, the risk of delayed recognition of loss reserve development is higher for assumed reinsurance than for direct insurance lines; and
- The historical claims data for a particular reinsurance contract can be limited relative to our insurance business in that there may be less historical information available. Further, for certain coverages or products, such as excess of loss contracts, there may be relatively few expected claims in a particular year so the actual number of claims may be susceptible to significant variability. In such cases, the actuary often relies on industry data from several recognized sources.

We mitigate the above risks in several ways. In addition to routine analytical reviews of ceding company reports to ensure reported claims information appears reasonable, we perform regular underwriting and claims audits of certain ceding companies to ensure reported claims information is accurate, complete, and timely. As appropriate, audit findings are used to adjust claims in the reserving process. We also use our knowledge of the historical development of losses from individual ceding companies to adjust the level of adequacy we believe exists in the reported ceded losses.

On occasion, there will be differences between our carried loss reserves and unearned premium reserves and the amount of loss reserves and unearned premium reserves reported by the ceding companies. This is due to the fact that we receive consistent and timely information from ceding companies only with respect to case reserves. For IBNR, we use historical experience and other statistical information, depending on the type of business, to estimate the ultimate loss. We estimate our unearned premium reserve by applying estimated earning patterns to net premiums written for each treaty based upon that treaty's coverage basis (i.e., risks attaching or losses occurring). At December 31, 2019, the case reserves reported to us by our ceding companies were $758 million, compared with the $769 million we recorded. Our policy is to post additional case reserves in addition to the amounts reported by our cedants when our evaluation of the ultimate value of a reported claim is different than the evaluation of that claim by our cedant.

Within Corporate, we also have exposure to certain liability reinsurance lines that have been in run-off since 1994. Unpaid losses and loss expenses relating to this run-off reinsurance business resides within the Brandywine Division reported within Corporate. Most of the remaining unpaid loss and loss expense reserves for the run-off reinsurance business relate to A&E claims. Refer to the “Asbestos and Environmental (A&E)” section for additional information.

Asbestos and environmental reserves
Included in our liabilities for losses and loss expenses are amounts for A&E (A&E liabilities). The A&E liabilities principally relate to claims arising from bodily-injury claims related to asbestos products and remediation costs associated with hazardous waste sites. The estimation of our A&E liabilities is particularly sensitive to future changes in the legal, social, and economic environment. We have not assumed any such future changes in setting the value of our A&E liabilities, which include provisions for both reported and IBNR claims.

There are many complex variables that we consider when estimating the reserves for our inventory of asbestos accounts and these variables may directly impact the predicted outcome. We believe the most significant variables relating to our A&E liabilities include the current legal environment; specific settlements that may be used as precedents to settle future claims; assumptions regarding trends with respect to claim severity and the frequency of higher severity claims; assumptions regarding the ability to allocate liability among defendants (including bankruptcy trusts) and other insurers; the ability of a claimant to bring a claim in a state in which they have no residency or exposure; the ability of a policyholder to claim the right to unaggregated coverage; whether high-level excess policies have the potential to be accessed given the policyholder's claim trends and liability situation; payments to unimpaired claimants; and, the potential liability of peripheral defendants. Based on the policies, the facts, the law, and a careful analysis of the impact that these factors will likely have on any given account, we estimate the potential liability for indemnity, policyholder defense costs, and coverage litigation expense.

The results in asbestos cases announced by other carriers or defendants may well have little or no relevance to us because coverage exposures are highly dependent upon the specific facts of individual coverage and resolution status of disputes among carriers, policyholders, and claimants.

For additional information refer to the “Asbestos and Environmental (A&E)” section and to Note 7 to the Consolidated Financial Statements.

Future policy benefits reserves
We issue contracts in our Overseas General Insurance and Life Insurance segments that are classified as long-duration. These contracts generally include accident and supplemental health products, term and whole life products, endowment products, and annuities. In accordance with GAAP, we establish reserves for contracts determined to be long-duration based on approved actuarial methods that include assumptions related to expenses, mortality, morbidity, persistency, and investment yields with a factor for adverse deviation. These assumptions are “locked in” at the inception of the contract, meaning we use our original assumptions throughout the life of the policy and do not subsequently modify them unless we deem the reserves to be inadequate. The future policy benefits reserves balance is regularly evaluated for a premium deficiency. If experience is less favorable than assumptions, additional liabilities may be required, resulting in a charge to policyholder benefits and claims.

Valuation of value of business acquired (VOBA), and amortization of deferred policy acquisition costs and VOBA
As part of the acquisition of businesses that sell long-duration contracts, such as life products, we established an intangible asset related to VOBA, which represented the fair value of the future profits of the in-force contracts. The valuation of VOBA at the time of acquisition is derived from similar assumptions to those used to establish the associated future policy benefits

reserves. The most significant input in this calculation is the discount rate used to arrive at the present value of the net cash flows. We amortize deferred policy acquisition costs associated with long-duration contracts and VOBA (collectively policy acquisition costs) over the estimated life of the contracts, generally in proportion to premium revenue recognized based upon the same assumptions used in estimating the liability for future policy benefits. For non-traditional long-duration contracts, we amortize policy acquisition costs over the expected life of the contracts in proportion to estimates of expected gross profits. The estimated life is established at the inception of the contracts or upon acquisition and is based on current persistency assumptions. Policy acquisition costs, which consist of commissions, premium taxes, and certain underwriting costs related directly to the successful acquisition of a new or renewal insurance contract, are reviewed to determine if they are recoverable from future income, including investment income. Unrecoverable costs are expensed in the period identified.

Risk transfer
In the ordinary course of business, we both purchase (or cede) and sell (or assume) reinsurance protection. We discontinued the purchase of all finite risk reinsurance contracts, as a matter of policy, in 2002. For both ceded and assumed reinsurance, risk transfer requirements must be met in order to use reinsurance accounting, principally resulting in the recognition of cash flows under the contract as premiums and losses. If risk transfer requirements are not met, a contract is to be accounted for as a deposit, typically resulting in the recognition of cash flows under the contract through a deposit asset or liability and not as revenue or expense. To meet risk transfer requirements, a reinsurance contract must include both insurance risk, consisting of underwriting and timing risk, and a reasonable possibility of a significant loss for the assuming entity. We also apply similar risk transfer requirements to determine whether certain commercial insurance contracts should be accounted for as insurance or a deposit. Contracts that include fixed premium (i.e., premium not subject to adjustment based on loss experience under the contract) for fixed coverage generally transfer risk and do not require judgment.

Reinsurance and insurance contracts that include both significant risk sharing provisions, such as adjustments to premiums or loss coverage based on loss experience, and relatively low policy limits, as evidenced by a high proportion of maximum premium assessments to loss limits, can require considerable judgment to determine whether or not risk transfer requirements are met. For such contracts, often referred to as finite or structured products, we require that risk transfer be specifically assessed for each contract by developing expected cash flow analyses at contract inception. To support risk transfer, the cash flow analyses must demonstrate that a significant loss is reasonably possible, such as a scenario in which the ratio of the net present value of losses divided by the net present value of premiums equals or exceeds 110 percent. For purposes of cash flow analyses, we generally use a risk-free rate of return consistent with the expected average duration of loss payments. In addition, to support insurance risk, we must prove the reinsurer's risk of loss varies with that of the reinsured and/or support various scenarios under which the assuming entity can recognize a significant loss.

To ensure risk transfer requirements are routinely assessed, qualitative and quantitative risk transfer analyses and memoranda supporting risk transfer are developed by underwriters for all structured products. We have established protocols for structured products that include criteria triggering an accounting review of the contract prior to quoting. If any criterion is triggered, a contract must be reviewed by a committee established by each of our segments with reporting oversight, including peer review, from our global Structured Transaction Review Committee.

With respect to ceded reinsurance, we entered into a few multi-year excess of loss retrospectively-rated contracts, principally in 2002. These contracts primarily provided severity protection for specific product divisions. Because traditional one-year reinsurance coverage had become relatively costly, these contracts were generally entered into in order to secure a more cost-effective reinsurance program. All of these contracts transferred risk and were accounted for as reinsurance. In addition, we maintain a few aggregate excess of loss reinsurance contracts that were principally entered into prior to 2003, such as the National Indemnity Company (NICO) contracts referred to in the section entitled, “Asbestos and Environmental (A&E)”. We have not purchased any other retroactive ceded reinsurance contracts since 1999.

With respect to assumed reinsurance and insurance contracts, products giving rise to judgments regarding risk transfer were primarily sold by our financial solutions business. Although we have significantly curtailed writing financial solutions business, several contracts remain in-force and principally include multi-year retrospectively-rated contracts and loss portfolio transfers. Because transfer of insurance risk is generally a primary client motivation for purchasing these products, relatively few insurance and reinsurance contracts have historically been written for which we concluded that risk transfer criteria had not been met. For certain insurance contracts that have been reported as deposits, the insured desired to self-insure a risk but was required, legally or otherwise, to purchase insurance so that claimants would be protected by a licensed insurance company in the event of non-payment from the insured.

Reinsurance recoverable

Reinsurance recoverable includes balances due to us from reinsurance companies for paid and unpaid losses and loss expenses and is presented net of a provision for uncollectible reinsurance. The provision for uncollectible reinsurance is determined based upon a review of the financial condition of the reinsurers and other factors. Ceded reinsurance contracts do not relieve our primary obligation to our policyholders. Consequently, an exposure exists with respect to reinsurance recoverable to the extent that any reinsurer is unable or unwilling to meet its obligations or disputes the liabilities assumed under the reinsurance contracts. We determine the reinsurance recoverable on unpaid losses and loss expenses using actuarial estimates as well as a determination of our ability to cede unpaid losses and loss expenses under existing reinsurance contracts.

The recognition of a reinsurance recoverable asset requires two key judgments. The first judgment involves our estimation based on the amount of gross reserves and the percentage of that amount which may be ceded to reinsurers. Ceded IBNR, which is a major component of the reinsurance recoverable on unpaid losses and loss expenses, is generally developed as part of our loss reserving process and, consequently, its estimation is subject to similar risks and uncertainties as the estimation of gross IBNR (refer to "Critical Accounting Estimates – Unpaid losses and loss expenses"). The second judgment involves our estimate of the amount of the reinsurance recoverable balance that we may ultimately be unable to recover from reinsurers due to insolvency, contractual dispute, or for other reasons. Estimated uncollectible amounts are reflected in a provision that reduces the reinsurance recoverable asset and, in turn, shareholders' equity. Changes in the provision for uncollectible reinsurance are reflected in net income.

Although the obligation of individual reinsurers to pay their reinsurance obligations is based on specific contract provisions, the collectability of such amounts requires estimation by management. The majority of the recoverable balance will not be due for collection until sometime in the future, and the duration of our recoverables may be longer than the duration of our direct exposures. Over this period of time, economic conditions and operational performance of a particular reinsurer may impact their ability to meet these obligations and while they may continue to acknowledge their contractual obligation to do so, they may not have the financial resources or willingness to fully meet their obligation to us.

To estimate the provision for uncollectible reinsurance, the reinsurance recoverable must first be determined for each reinsurer. This determination is based on a process rather than an estimate, although an element of judgment must be applied. As part of the process, ceded IBNR is allocated to reinsurance contracts because ceded IBNR is not generally calculated on a contract by contract basis. The allocations are generally based on premiums ceded under reinsurance contracts, adjusted for actual loss experience and historical relationships between gross and ceded losses. If actual premium and loss experience vary materially from historical experience, the allocation of reinsurance recoverable by reinsurer will be reviewed and may change. While such change is unlikely to result in a large percentage change in the provision for uncollectible reinsurance, it could, nevertheless, have a material effect on our net income in the period recorded.

Generally, we use a default analysis to estimate uncollectible reinsurance. The primary components of the default analysis are reinsurance recoverable balances by reinsurer, net of collateral, and default factors used to estimate the probability that the reinsurer may be unable to meet its future obligations in full. The definition of collateral for this purpose requires some judgment and is generally limited to assets held in a Chubb-only beneficiary trust, letters of credit, and liabilities held by us with the same legal entity for which we believe there is a right of offset. We do not currently include multi-beneficiary trusts. However, we have several reinsurers that have established multi-beneficiary trusts for which certain of our companies are beneficiaries. The determination of the default factor is principally based on the financial strength rating of the reinsurer and a corresponding default factor applicable to the financial strength rating. Default factors require considerable judgment and are determined using the current financial strength rating, or rating equivalent, of each reinsurer as well as other key considerations and assumptions. Significant considerations and assumptions include, but are not necessarily limited to, the following:

- For reinsurers that maintain a financial strength rating from a major rating agency, and for which recoverable balances are considered representative of the larger population (i.e., default probabilities are consistent with similarly rated reinsurers and payment durations conform to averages), the judgment exercised by management to determine the provision for uncollectible reinsurance of each reinsurer is typically limited because the financial rating is based on a published source and the default factor we apply is based on a historical default factor of a major rating agency applicable to the particular rating class. Default factors applied for financial ratings of AAA, AA, A, BBB, BB, B, and CCC, are 0.8 percent, 1.2 percent, 1.7 percent, 4.9 percent, 19.6 percent, 34.0 percent, and 62.2 percent, respectively. Because our model is predicated on the historical default factors of a major rating agency, we do not generally consider alternative factors. However, when a recoverable is expected to be paid in a brief period of time by a highly-rated reinsurer, such as certain property catastrophe claims, a default factor may not be applied;

- For balances recoverable from reinsurers that are both unrated by a major rating agency and for which management is unable to determine a credible rating equivalent based on a parent or affiliated company, we may determine a rating equivalent based on our analysis of the reinsurer that considers an assessment of the creditworthiness of the particular entity, industry benchmarks, or other factors as considered appropriate. We then apply the applicable default factor for that rating class. For balances recoverable from unrated reinsurers for which our ceded reserve is below a certain threshold, we generally apply a default factor of 34.0 percent;
- For balances recoverable from reinsurers that are either insolvent or under regulatory supervision, we establish a default factor and resulting provision for uncollectible reinsurance based on specific facts and circumstances surrounding each company. Upon initial notification of an insolvency, we generally recognize expense for a substantial portion of all balances outstanding, net of collateral, through a combination of write-offs of recoverable balances and increases to the provision for uncollectible reinsurance. When regulatory action is taken on a reinsurer, we generally recognize a default factor by estimating an expected recovery on all balances outstanding, net of collateral. When sufficient credible information becomes available, we adjust the provision for uncollectible reinsurance by establishing a default factor pursuant to information received; and
- For captives and other recoverables, management determines the provision for uncollectible reinsurance based on the specific facts and circumstances.

The following table summarizes reinsurance recoverables and the provision for uncollectible reinsurance for each type of recoverable balance at December 31, 2019:

(in millions of U.S. dollars)	Gross Reinsurance Recoverables on Losses and Loss Expenses	Recoverables (net of Usable Collateral)	Provision for Uncollectible Reinsurance (1)
Type			
Reinsurers with credit ratings	$ 11,460	$ 10,043	$ 156
Reinsurers not rated	321	190	66
Reinsurers under supervision and insolvent reinsurers	81	79	37
Captives	2,647	378	20
Other - structured settlements and pools	988	978	37
Total	$ 15,497	$ 11,668	$ 316

(1) The provision for uncollectible reinsurance is based on a default analysis applied to gross reinsurance recoverables, net of approximately $3.8 billion of collateral at December 31, 2019.

At December 31, 2019, the use of different assumptions within our approach could have a material effect on the provision for uncollectible reinsurance. To the extent the creditworthiness of our reinsurers were to deteriorate due to an adverse event affecting the reinsurance industry, such as a large number of major catastrophes, actual uncollectible amounts could be significantly greater than our provision for uncollectible reinsurance. Such an event could have a material adverse effect on our financial condition, results of operations, and our liquidity. Given the various considerations used to estimate our uncollectible provision, we cannot precisely quantify the effect a specific industry event may have on the provision for uncollectible reinsurance. However, based on the composition (particularly the average credit quality) of the reinsurance recoverable balance at December 31, 2019, we estimate that a ratings downgrade of one notch for all rated reinsurers (e.g., from A to A- or A- to BBB+) could increase our provision for uncollectible reinsurance by approximately $66 million or approximately 0.4 percent of the gross reinsurance recoverable balance, assuming no other changes relevant to the calculation. While a ratings downgrade would result in an increase in our provision for uncollectible reinsurance and a charge to earnings in that period, a downgrade in and of itself does not imply that we will be unable to collect all of the ceded reinsurance recoverable from the reinsurers in question. Refer to Note 5 to the Consolidated Financial Statements for additional information.

Fair value measurements
Accounting guidance defines fair value as the price to sell an asset or transfer a liability (an exit price) in an orderly transaction between market participants and establishes a three-level valuation hierarchy based on the reliability of the inputs. The fair value hierarchy gives the highest priority to quoted prices in active markets (Level 1 inputs) and the lowest priority to unobservable data (Level 3 inputs). Level 2 includes inputs, other than quoted prices within Level 1, that are observable for assets or liabilities either directly or indirectly. Refer to Note 4 and Note 13 to the Consolidated Financial Statements for information on our fair value measurements.

Other-than-temporary impairments (OTTI)
Each quarter, we review securities in an unrealized loss position (impaired securities), including fixed maturities and securities lending collateral to identify impaired securities to be specifically evaluated for a potential OTTI. Because our investment portfolio is the largest component of consolidated assets, OTTI could be material to our financial condition and results of operations. Refer to Note 3 c) to the Consolidated Financial Statements for a description of the OTTI process.

Deferred income taxes
At December 31, 2019, our net deferred tax liability was $804 million. Our deferred tax assets and liabilities primarily result from temporary differences between the amounts recorded in our consolidated financial statements and the tax basis of our assets and liabilities. We determine deferred tax assets and liabilities separately for each tax-paying component (an individual entity or group of entities that is consolidated for tax purposes) in each tax jurisdiction. The realization of deferred tax assets depends upon the existence of sufficient taxable income within the carryback or carryforward periods under the tax law in the applicable tax jurisdiction. There may be changes in tax laws in a number of countries where we transact business that impact our deferred tax assets and liabilities.

At each balance sheet date, management assesses the need to establish a valuation allowance that reduces deferred tax assets when it is more likely than not that all, or some portion, of the deferred tax assets will not be realized. The determination of the need for a valuation allowance is based on all available information including projections of future taxable income, principally derived from business plans and where appropriate available tax planning strategies. Projections of future taxable income incorporate assumptions of future business and operations that are apt to differ from actual experience. If our assumptions and estimates that resulted in our forecast of future taxable income prove to be incorrect, an additional valuation allowance could become necessary, which could have a material adverse effect on our financial condition, results of operations, and liquidity. At December 31, 2019, the valuation allowance of $114 million reflects management's assessment that it is more likely than not that a portion of the deferred tax assets will not be realized due to the inability of certain foreign subsidiaries to generate sufficient taxable income.

Assumed reinsurance programs involving minimum benefit guarantees under variable annuity contracts
Chubb reinsures various death and living benefit guarantees associated with variable annuities issued primarily in the United States. We ceased writing this business in 2007. Guarantees which are payable on death are referred to as guaranteed minimum death benefits (GMDB). Guarantees on living benefits (GLB) consist mainly of guaranteed minimum income benefits (GMIB). For further description of this product and related accounting treatment, refer to Note 1 j) to the Consolidated Financial Statements.

Guaranteed living benefits (GLB) derivatives
Our GLB reinsurance is classified as a derivative for accounting purposes and therefore carried at fair value. We believe that the most meaningful presentation of these GLB derivatives is as follows:

- Estimates of the average modeled value of future cash outflows is recorded as incurred losses (i.e., benefit reserves). Cash inflows or revenue are reported as net premiums earned and changes in the benefit reserves are reflected as Policy benefits expense in the Consolidated statements of operations, which is included in underwriting income.
- The incremental difference between the fair value of GLB reinsurance contracts and benefit reserves is reflected in Accounts payable, accrued expenses, and other liabilities in the Consolidated balance sheets and related changes in fair value are reflected in Net realized gains (losses) in the Consolidated statements of operations.

Determination of GLB fair value
The fair value of GLB reinsurance is estimated using an internal valuation model, which includes current market information and estimates of policyholder behavior from the perspective of a theoretical market participant that would assume these liabilities. All of our treaties contain claim limits, which are factored into the valuation model. The fair value depends on a number of factors, including interest rates, equity markets, credit risk, current account value, market volatility, expected annuitization rates and other policyholder behavior, and changes in policyholder mortality. The model and related assumptions are regularly re-evaluated by management and enhanced, as appropriate, based upon additional experience obtained related to policyholder behavior and availability of more timely market information. Due to the inherent uncertainties of the assumptions used in the valuation models to determine the fair value of these derivative products, actual experience may differ materially from the estimates reflected in our Consolidated Financial Statements.

We intend to hold these derivative contracts to maturity (i.e., the expiration of the underlying liabilities through lapse, annuitization, death, or expiration of the reinsurance contract). To partially offset the risk of changes in the fair value of GLB reinsurance contracts, we invest in derivative hedge instruments. At maturity, the cumulative realized gains and losses (excluding cumulative hedge gains or losses) from fair value changes of GLB reinsurance contracts will net to zero because, over time, the insurance liability will be increased or decreased to equal our obligation.

Determination of GLB and GMDB benefit reserves
Management established benefit reserves based on a long-term benefit ratio (or loss ratio) calculated using assumptions reflecting management's best estimate of the future short-term and long-term performance of the variable annuity line of business. Despite the long-term nature of the risk, the benefit ratio calculation is impacted by short-term market movements that may be judged by management to be transient. Management regularly examines both qualitative and quantitative analysis, including a review of the differential between the benefit ratio used at the most recent valuation date and the benefit ratio calculated on subsequent dates. Management regularly evaluates its estimates and uses judgment to determine the extent to which assumptions underlying the benefit ratio calculation should be adjusted. For the year ended December 31, 2019, management determined that no change to the benefit ratio was warranted.

For further information on the estimates and assumptions used in determining the fair value of GLB reinsurance, refer to Note 4 to the Consolidated Financial Statements. For a sensitivity discussion of the effect of changes in interest rates, equity indices, and other assumptions on the fair value of GLBs, and the estimated resulting impact on our net income, refer to Item 7A.

Risk Management
We employ a strategy to manage the financial market and policyholder behavior risks embedded in the reinsurance of variable annuity (VA) guarantees. Risk management begins with underwriting a prospective client and guarantee design, with particular focus on protecting our position from policyholder options that, because of anti-selective behavior, could adversely impact our obligation.

A second layer of risk management is the structure of the reinsurance contracts. All VA guarantee reinsurance contracts include some form of annual or aggregate claim limit(s) primarily designed to reduce our exposure to severe equity market and/or interest rate declines (which would cause an increase in expected claims).

A third layer of risk management is the hedging strategy which looks to mitigate both long-term economic loss over time as well as dampen income statement volatility. We owned financial market instruments as part of the hedging strategy with a fair value asset (liability) of $(13) million and $23 million at December 31, 2019 and 2018, respectively. The instruments are substantially collateralized on a daily basis.

We also limit the aggregate amount of variable annuity reinsurance guarantee risk we are willing to assume. The last substantive transactions were quoted in late 2007. The aggregate number of policyholders is currently decreasing through policyholder withdrawals, annuitizations, and deaths at a rate of 5 percent to 15 percent per annum.

Note that GLB claims cannot occur for any reinsured policy until it has reached the end of its "waiting period". As shown in the table below, 92 percent of the policies we reinsure reached the end of their "waiting periods" in 2019 and prior.

Year of first payment eligibility	Percent of living benefit account values
2019 and prior	92%
2020	1%
2021	2%
2022	—%
2023	1%
2024 and after	4%
Total	100%

The following table presents the historical cash flows under these policies for the periods indicated. The amounts represent accrued past premium received and claims paid, split by benefit type.

			2019			2018			2017
(in millions of U.S. dollars)	**GMDB**	**GLB**	**Total**	GMDB	GLB	Total	GMDB	GLB	Total
Premium received	**$ 40**	**$ 91**	**$ 131**	$ 47	$ 96	$ 143	$ 49	$ 110	$ 159
Less paid claims	**34**	**91**	**125**	32	49	81	31	54	85
Net cash received	**$ 6**	**$ —**	**$ 6**	$ 15	$ 47	$ 62	$ 18	$ 56	$ 74

Collateral
Chubb holds collateral on behalf of most of its clients in the form of qualified assets in trust or letters of credit, typically in an amount sufficient for the client to obtain statutory reserve credit for the reinsurance. The timing of the calculation and amount of the collateral varies by client according to the particulars of the reinsurance treaty and the statutory reserve guidelines of the client's domicile.

Goodwill impairment assessment
Goodwill, which represents the excess of acquisition cost over the estimated fair value of net assets acquired, was $15.3 billion at both December 31, 2019 and 2018. Goodwill is assigned to applicable reporting units of acquired entities at the time of acquisition. Our reporting units are the same as our reportable segments. For goodwill balances by reporting units, refer to Note 6 to the Consolidated Financial Statements.

Goodwill is not amortized but is subject to a periodic evaluation for impairment at least annually, or earlier if there are any indications of possible impairment. Impairment is tested at the reporting unit level. The impairment evaluation first uses a qualitative assessment to determine whether it is more likely than not (i.e., more than a 50 percent probability) that the fair value of a reporting unit is greater than its carrying amount. If a reporting unit fails this qualitative assessment, a single quantitative analysis is used to measure and record the amount of the impairment.

In assessing the fair value of a reporting unit, we make assumptions and estimates about the profitability attributable to our reporting units, including:

- short-term and long-term growth rates; and
- estimated cost of equity and changes in long-term risk-free interest rates.

If our assumptions and estimates made in assessing the fair value of acquired entities change, we could be required to write-down the carrying value of goodwill which could be material to our results of operations in the period the charge is taken. Based on our impairment testing for 2019, we determined no impairment was required and none of our reporting units was at risk for impairment.

Consolidated Operating Results – Years Ended December 31, 2019, 2018, and 2017

(in millions of U.S. dollars, except for percentages)	2019	2018	2017	% Change 2019 vs. 2018	% Change 2018 vs. 2017
Net premiums written	$ 32,275	$ 30,579	$ 29,244	5.5 %	4.6 %
Net premiums earned	31,290	30,064	29,034	4.1 %	3.5 %
Net investment income	3,426	3,305	3,125	3.6 %	5.8 %
Net realized gains (losses)	(530)	(652)	84	(18.8)%	NM
Total revenues	34,186	32,717	32,243	4.5 %	1.5 %
Losses and loss expenses	18,730	18,067	18,454	3.7 %	(2.1)%
Policy benefits	740	590	676	25.5 %	(12.7)%
Policy acquisition costs	6,153	5,912	5,781	4.1 %	2.3 %
Administrative expenses	3,030	2,886	2,833	5.0 %	1.9 %
Interest expense	552	641	607	(13.9)%	5.6 %
Other (income) expense	(596)	(434)	(400)	37.2 %	8.5 %
Amortization of purchased intangibles	305	339	260	(10.2)%	30.4 %
Chubb integration expenses	23	59	310	(61.7)%	(81.0)%
Total expenses	28,937	28,060	28,521	3.1 %	(1.6)%
Income before income tax	5,249	4,657	3,722	12.7 %	25.1 %
Income tax expense (benefit)	795	695	(139)	14.3 %	NM
Net income	$ 4,454	$ 3,962	$ 3,861	12.4 %	2.6 %
Net premiums written - constant dollars (1)				7.0 %	4.1 %
Net premiums earned - constant dollars (1)				5.5 %	3.1 %

NM – not meaningful

(1) On a constant-dollar basis. Amounts are calculated by translating prior period results using the same local currency rates as the comparable current period.

Net Premiums Written

2019 vs. 2018

Net premiums written reflect the premiums we retain after purchasing reinsurance protection. Consolidated net premiums written increased $1.7 billion in 2019, or $2.1 billion on a constant-dollar basis, reflecting growth across most segments.

- Net premiums written in our North America Commercial P&C Insurance segment increased $890 million (7.1 percent) in 2019, reflecting positive rate increases, new business written and strong retention across most retail lines, including property, financial lines, excess casualty, risk management, and commercial package, as well as in our wholesale and high excess Bermuda lines, and in our small commercial businesses.
- Net premiums written in our North America Personal P&C Insurance segment increased $113 million (2.4 percent) in 2019, primarily due to strong retention and rate and exposure increases across most lines, partially offset by a $44 million benefit in 2018 related to the harmonization of our legacy premium registration systems, which unfavorably impacted growth by approximately 0.9 percentage points.
- Net premiums written in our North America Agricultural Insurance segment increased $233 million (14.8 percent) in 2019, primarily due to growth in our MPCI business and growth in our Chubb Agribusiness. Growth in our MPCI premium was driven primarily by higher retention as a result of the premium sharing formulas under the U.S. government, as well as the non-renewal of a quota-share treaty effective with the current crop year and an increase in current year production. Under the MPCI premium sharing formula under the U.S. government, we cede additional premiums to the government during profitable years. In 2018, the program was more profitable which resulted in higher cessions compared to 2019.
- Net premiums written in our Overseas General Insurance segment increased $360 million (4.0 percent) in 2019, or $722 million (8.4 percent) on a constant-dollar basis, reflecting growth across all regions and most lines of business. P&C lines growth was across all regions and was principally due to positive rate increases and new business in property, casualty, and financial lines. Personal lines growth was driven by new business principally in Latin America and Europe. Accident and health (A&H) lines growth was principally in Asia and Latin America driven by new business.

- Net premiums written in our Global Reinsurance segment decreased $22 million (3.2 percent) in 2019, or $12 million (1.7 percent) on a constant-dollar basis, as an increase in new business written in property and marine lines was more than offset by an increase in ceded retrocessions, reductions in the international motor line, and higher reinstatement premiums collected in the prior year.
- Net premiums written in our Life Insurance segment increased $122 million (5.3 percent) in 2019, or $143 million (6.4 percent) on a constant-dollar basis, primarily reflecting growth in our Asian and Latin American international life operations and North American Combined Insurance supplemental A&H program, partially offset by our life reinsurance business, which continues to decline as no new life reinsurance business is being written.

2018 vs. 2017
Consolidated net premiums written increased $1.3 billion in 2018, or $1.2 billion (4.1 percent) on a constant-dollar basis, reflecting growth across most segments.

- Net premiums written in our North America Commercial P&C Insurance segment increased $466 million (3.9 percent) in 2018 reflecting positive rate increases, new business written, and strong renewals across a number of lines. Retail casualty and risk management, A&H, retail property, and continued growth in our small commercial business represented $339 million of the $466 million increase. In addition, the year-over-year increase in large structured transactions was $195 million. This growth was partially offset by merger-related underwriting actions of $123 million and premium reductions from planned portfolio management in our retail and wholesale brokerage financial lines ($62 million).
- Net premiums written in our North America Personal P&C Insurance segment increased $141 million (3.1 percent) for 2018, primarily due to strong retention and new business growth in homeowners and complementary products such as automobiles and valuables. In addition, the non-renewal of a quota share treaty in the second quarter of 2017 covering the acquired Fireman's Fund homeowners and automobile businesses added $47 million of additional net premiums written in 2018. These increases were partially offset by the addition of California to the homeowners quota share reinsurance treaty, effective October 1, 2018 ($47 million), which included a non-recurring unearned premium reserves (UPR) transfer of $32 million.
- Net premiums written in our North America Agricultural Insurance segment increased $61 million (4.0 percent) in 2018, primarily due to growth in our MPCI business and growth in our Chubb Agribusiness. The growth in MPCI premium was driven by policy count growth and the year-over-year impact of the premium sharing formulas under the U.S. government. In 2017, the program was more profitable which resulted in higher cessions compared to 2018. The increase was partially offset by lower volatility factors, which are a component of the policy pricing that measures the likelihood the commodity price will fluctuate over the crop year and reduces the premium we charge.
- Net premiums written in our Overseas General Insurance segment increased $552 million (6.6 percent) in 2018, or $448 million (5.3 percent) on a constant-dollar basis, reflecting growth across most regions and lines of business. P&C lines growth was across all regions, principally in small commercial property and general casualty lines reflecting new business, and in middle market driven by new business and rate increases. Personal lines growth was principally in our automobile line in Mexico driven by new business, as well as in our specialty lines in Asia. A&H lines growth was principally in Asia driven by new business.
- Net premiums written in our Global Reinsurance segment decreased $14 million (2.1 percent) in 2018, or $22 million (3.3 percent) on a constant-dollar basis, primarily due to higher reinstatement premiums collected in the prior year principally relating to the 2017 natural catastrophes ($15 million year-over-year decrease) and lower renewals, which is reflective of competitive market conditions primarily in catastrophe and catastrophe exposed lines of business, partially offset by new business written in the casualty line of business.
- Net premiums written in our Life Insurance segment increased $129 million (6.1 percent) in 2018, or $123 million (5.7 percent) on a constant-dollar basis, primarily due to growth in our North American Combined Insurance supplemental A&H program business, and Asian and Latin American international life operations, partially offset by our life reinsurance business, which continues to decline as no new life reinsurance business is being written.

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Net Premiums Written By Line of Business

(in millions of U.S. dollars, except for percentages)	2019	2018	2017	C$ [1] 2018	% Change C$ [1] 2019 vs. 2018
Commercial casualty	**$ 5,654**	$ 5,204	$ 4,721	$ 5,154	9.7 %
Workers' compensation	**2,098**	2,094	2,067	2,094	0.1 %
Professional liability	**3,697**	3,527	3,547	3,479	6.3 %
Surety	**639**	635	627	622	2.7 %
Commercial multiple peril [2]	**983**	910	879	910	8.0 %
Property and other short-tail lines	**4,468**	4,016	3,819	3,930	13.7 %
Total Commercial P&C [3]	**17,539**	16,386	15,660	16,189	8.3 %
Agriculture	**1,810**	1,577	1,516	1,577	14.8 %
Personal automobile	**1,786**	1,695	1,563	1,685	6.0 %
Personal homeowners	**3,513**	3,391	3,302	3,383	3.9 %
Personal other	**1,514**	1,508	1,441	1,454	4.0 %
Total Personal lines	**6,813**	6,594	6,306	6,522	4.4 %
Total Property and Casualty lines	**26,162**	24,557	23,482	24,288	7.7 %
Global A&H lines [4]	**4,315**	4,277	4,056	4,157	3.8 %
Reinsurance lines	**649**	671	685	661	(1.7)%
Life	**1,149**	1,074	1,021	1,059	8.5 %
Total consolidated	**$ 32,275**	$ 30,579	$ 29,244	$ 30,165	7.0 %

(1) On a constant-dollar basis. Amounts are calculated by translating prior period results using the same local currency rates as the comparable current period.
(2) Commercial multiple peril represents retail package business (property and general liability).
(3) 2018 included a reclassification of $56 million from Workers' compensation and $1 million from Commercial multiple peril to Commercial casualty ($48 million) and Property and other short-tail lines ($9 million) to better align the reporting with current year. There is no impact to total Commercial P&C.
(4) For purposes of this schedule only, A&H results from our Combined North America and International businesses, normally included in the Life Insurance and Overseas General Insurance segments, respectively, as well as the A&H results of our North America Commercial P&C segment, are included in Global A&H lines above.

The increase in net premiums written in 2019 reflects growth across most lines of business.
- The growth in commercial casualty was due to new business and rate improvement in North America. In addition, commercial casualty grew internationally due to positive rate increases and new business across Europe, as well as growth in Australia.
- Growth in workers' compensation was adversely impacted by competitive market conditions in North America.
- The increase in professional liability was due to growth in North America and new business in Australia and Europe. Professional liability also had positive rate increases and retention in Australia.
- Surety increased due to new business in North America.
- Commercial multiple peril increased due to new business and higher renewal business in North America.
- Property and other short-tail lines increased due to growth in North America. In addition, property and other short-tail lines increased internationally, primarily due to new business in Australia and across Europe, as well as positive rate increases internationally.
- Our personal lines increased due to strong retention and rate and exposure increases in North America. Personal lines also increased due to growth in Latin America and Europe.
- Global A&H lines increased due to growth in our North American Combined Insurance supplemental A&H program, along with new business in Asia and Latin America.
- The increase in Life was primarily driven by growth in our Asian and Latin American international life operations.

For additional information on net premiums written, refer to the segment results discussions.

Net Premiums Earned
2019 vs. 2018
Net premiums earned for short-duration contracts, typically P&C contracts, generally reflect the portion of net premiums written that were recorded as revenues for the period as the exposure periods expire. Net premiums earned for long-duration contracts, typically traditional life contracts, generally are recognized as earned when due from policyholders. Net premiums earned increased $1.2 billion, or $1.6 billion on a constant-dollar basis in 2019, reflecting the growth in net premiums written described above, including the impact of premiums that were fully earned when written (e.g., large structured transactions and audit and retrospective premium adjustments).

2018 vs. 2017
Net premiums earned increased $1.0 billion, or $912 million on a constant-dollar basis in 2018, primarily due to the same factors driving the increase in net premiums written as described above. Net premiums earned were favorably impacted by the year-over-year increase in large structured transactions ($163 million), a number of which were earned immediately when written. These retroactive transactions did not impact premiums earned in 2019 as they were fully earned in 2018.

P&C Combined Ratio
In evaluating our segments excluding Life Insurance financial performance, we use the P&C combined ratio, the loss and loss expense ratio, the policy acquisition cost ratio, and the administrative expense ratio. We calculate these ratios by dividing the respective expense amounts by net premiums earned. We do not calculate these ratios for the Life Insurance segment as we do not use these measures to monitor or manage that segment. The P&C combined ratio is determined by adding the loss and loss expense ratio, the policy acquisition cost ratio, and the administrative expense ratio. A P&C combined ratio under 100 percent indicates underwriting income, and a combined ratio exceeding 100 percent indicates underwriting loss.

	2019	2018	2017
Loss and loss expense ratio	**62.1%**	62.1%	65.8%
Policy acquisition cost ratio	**19.1%**	19.2%	19.5%
Administrative expense ratio	**9.4%**	9.3%	9.4%
P&C Combined ratio	**90.6%**	90.6%	94.7%

The loss and loss expense ratio decreased 3.7 percentage points in 2018 principally due to the following:

- Lower catastrophe losses;
- Integration-related claims handling expense savings;
- Partially offset by increased frequency and severity of homeowners losses in our North America Personal P&C Insurance segment, primarily non-catastrophe water related events and large fire losses which are trending above our expectations, and higher non-catastrophe large losses in our North America Commercial P&C Insurance segment.

Policy acquisition costs consist of commissions, premium taxes, and certain underwriting costs directly related to the successful acquisition of a new or renewal insurance contract. Our policy acquisition cost ratio decreased 0.3 percentage points in 2018 principally due to increased cessions under certain reinsurance agreements that resulted in higher ceded acquisition costs benefits than in the prior year.

Catastrophe Losses and Prior Period Development
Catastrophe losses exclude reinstatement premiums which are additional premiums paid on certain reinsurance agreements in order to reinstate coverage that had been exhausted by loss occurrences. The reinstatement premium amount is typically a pro rata portion of the original ceded premium paid based on how much of the reinsurance limit had been exhausted. Prior period development is net of related adjustments which typically relate to either profit commission reserves or policyholder dividend reserves based on actual claim experience that develops after the policy period ends. The expense adjustments correlate to the prior period loss development on these same policies. Refer to the Non-GAAP Reconciliation section for further information on reinstatement premiums on catastrophe losses and adjustments to prior period development.

(in millions of U.S dollars)	2019	2018	2017
Catastrophe losses (excludes reinstatement premiums)	**$ 1,175**	$ 1,622	$ 2,753
Favorable prior period development	**$ 792**	$ 896	$ 829

We generally define catastrophe loss events consistent with the definition of the Property Claims Service (PCS) for events in the U.S. and Canada. PCS defines a catastrophe as an event that causes damage of $25 million or more in insured property losses and affects a significant number of insureds. For events outside of the U.S. and Canada, we generally use a similar definition. The tables below represent catastrophe loss estimates for events that occurred in the related calendar year only. Changes in catastrophe loss estimates in the current calendar year that relate to loss events that occurred in previous calendar years are considered prior period development and are excluded from the tables below.

The following table presents catastrophe losses and reinstatement premiums (RIPs) collected (expensed) in 2019:

	Catastrophe Loss Charge by Event							
(in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Total excluding RIPs	RIPs collected (expensed)	Total including RIPs
Net losses								
U.S. flooding, hail, tornadoes, and wind events	**$ 220**	**$ 202**	**$ 7**	**$ —**	**$ 9**	**$ 438**	**$ —**	**$ 438**
Tornado in Dallas, Texas	**55**	**145**	**—**	**—**	**2**	**202**	**(11)**	**213**
Winter-related storms	**74**	**110**	**1**	**6**	**2**	**193**	**—**	**193**
Hurricane Dorian	**26**	**30**	**—**	**10**	**8**	**74**	**1**	**73**
California wildfires	**11**	**45**	**—**	**—**	**—**	**56**	**—**	**56**
Typhoon Hagibis	**—**	**—**	**—**	**20**	**17**	**37**	**1**	**36**
Civil unrest in Hong Kong and Chile	**—**	**—**	**—**	**33**	**—**	**33**	**(4)**	**37**
International weather-related events	**1**	**2**	**—**	**30**	**—**	**33**	**—**	**33**
Tropical Storm Imelda	**26**	**4**	**—**	**—**	**1**	**31**	**—**	**31**
Australia storms	**—**	**—**	**—**	**27**	**1**	**28**	**—**	**28**
Typhoon Faxai	**—**	**—**	**—**	**15**	**10**	**25**	**1**	**24**
Hurricane Barry	**3**	**4**	**—**	**—**	**—**	**7**	**—**	**7**
Australia wildfires	**—**	**—**	**—**	**5**	**—**	**5**	**—**	**5**
Other	**5**	**1**	**—**	**6**	**1**	**13**	**—**	**13**
Total	**$ 421**	**$ 543**	**$ 8**	**$ 152**	**$ 51**	**$ 1,175**		
RIPs collected (expensed)	**—**	**(11)**	**—**	**(4)**	**3**		**(12)**	
Total before income tax	**$ 421**	**$ 554**	**$ 8**	**$ 156**	**$ 48**			**$ 1,187**
Income tax benefit								**221**
Total after income tax								**$ 966**

The following table presents catastrophe losses and reinstatement premiums (RIPs) collected (expensed) in 2018:

	Catastrophe Loss Charge by Event							
(in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Total excluding RIPs	RIPs collected (expensed)	Total including RIPs
Net losses								
Hurricane Michael	$ 187	$ 16	$ 6	$ 6	$ 85	$ 300	$ 15	$ 285
U.S. flooding, hail, tornadoes, and wind events [(1)]	162	157	7	—	6	332	—	332
Northeast winter storms	43	117	—	—	5	165	—	165
California wildfires	51	61	1	1	58	172	(23)	195
Hurricane Florence	109	29	7	15	14	174	1	173
California mudslides	4	120	—	1	—	125	—	125
Colorado rain and hail storm	7	65	—	1	—	73	—	73
International weather-related events	—	—	—	182	31	213	2	211
Other	16	46	—	—	6	68	1	67
Total	$ 579	$ 611	$ 21	$ 206	$ 205	$ 1,622		
RIPs collected (expensed)	—	(26)	—	—	22		(4)	
Total before income tax	$ 579	$ 637	$ 21	$ 206	$ 183			$ 1,626
Income tax benefit								272
Total after income tax								$ 1,354

(1) This grouping comprised of 34 separate events, principally impacting the southern and northeastern regions of the U.S.

The following table presents catastrophe losses and reinstatement premiums (RIPs) collected (expensed) in 2017:

	Catastrophe Loss Charge by Event							
(in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Total excluding RIPs	RIPs collected (expensed)	Total including RIPs
Net losses								
N. California wildfires	$ 61	$ 151	$ —	$ 2	$ 42	$ 256	$ (21)	$ 277
S. California wildfires	23	134	—	—	—	157	—	157
Hurricane Harvey	391	175	1	40	48	655	5	650
Hurricane Irma	464	206	2	79	159	910	30	880
Hurricane Maria	50	—	—	89	55	194	(7)	201
Mexico Earthquakes	—	—	—	25	—	25	—	25
Other	231	205	15	96	9	556	—	556
Total	$ 1,220	$ 871	$ 18	$ 331	$ 313	$ 2,753		
RIPs collected (expensed)	(4)	(22)	—	(4)	37		7	
Total before income tax	$ 1,224	$ 893	$ 18	$ 335	$ 276			$ 2,746
Income tax benefit								575
Total after income tax								$ 2,171

Prior period development (PPD) arises from changes to loss estimates recognized in the current year that relate to loss events that occurred in previous calendar years and excludes the effect of losses from the development of earned premium from previous accident years.

Pre-tax net favorable prior period development for the year ended 2019 was $792 million, which included favorable development of $80 million in our crop insurance business and adverse development of $116 million related to legacy run-off exposures, principally asbestos and environmental liabilities. The remaining favorable development of $828 million comprised 92 percent long-tail lines, principally from accident years 2015 and prior, and 8 percent short-tail lines.

Net favorable prior period development for the year ended 2018 was $896 million, which included favorable reinsurance settlements of $205 million related to legacy run-off exposures, $197 million favorable development related to the 2017 catastrophe events, and favorable development of $110 million in our crop insurance business. There were $216 million of adverse development related to legacy run-off exposures, principally asbestos and environmental liabilities. The remaining favorable development of $600 million comprised 82 percent long-tail lines, principally for the 2014 and prior accident years, and 18 percent short-tail lines.

Refer to the Prior Period Development section in Note 7 to the Consolidated Financial Statements for additional information.

Current Accident Year (CAY) Loss Ratio excluding Catastrophe Losses (CATs)
The following table presents the impact of catastrophe losses and prior period development on our loss and loss expense ratio. Refer to the Non-GAAP Reconciliation section for additional information.

	2019	2018	2017
Loss and loss expense ratio	**62.1 %**	62.1 %	65.8 %
Catastrophe losses	**(4.1)%**	(5.8)%	(10.2)%
Favorable prior period development	**2.8 %**	3.3 %	3.2 %
CAY loss ratio excluding catastrophe losses	**60.8 %**	59.6 %	58.8 %

2019 vs. 2018
The CAY loss ratio excluding catastrophe losses increased 1.2 percentage points in 2019 principally due to the following:
- Downward revision in the 2019 crop year margin estimate reflecting preventive planting claims due to the impact of wet weather conditions and crop yield shortfalls resulting from poor growing conditions;
- Change in mix of business and earned price changes modestly below loss trends in certain classes of our business;
- Partially offset by the adverse impact of elevated homeowners losses in the prior year.

2018 vs. 2017
The CAY loss ratio excluding catastrophe losses increased 0.8 percentage points in 2018 principally due to the following:
- Increased frequency and severity of homeowners losses in our North America Personal P&C Insurance segment, primarily non-catastrophe water related events and large fire losses;
- Higher non-catastrophe large losses in our North America Commercial P&C Insurance segment;
- Partially offset by integration-related claims handling expense savings realized.

CAY P&C Combined Ratio excluding CATs

	2019	2018	2017
CAY Loss and loss expense ratio ex CATs	**60.8%**	59.6%	58.8%
CAY Policy acquisition cost ratio ex CATs	**19.1%**	19.2%	19.4%
CAY Administrative expense ratio ex CATs	**9.3%**	9.2%	9.4%
CAY P&C combined ratio ex CATs	**89.2%**	88.0%	87.6%

Policy benefits
Policy benefits represent losses on contracts classified as long-duration and generally include accident and supplemental health products, term and whole life products, endowment products, and annuities. Refer to the Life Insurance segment operating results section for further discussion.

Policy benefits were $740 million, $590 million and $676 million in 2019, 2018 and 2017, respectively, which included separate account liabilities (gains) losses of $44 million, $(38) million and $97 million, respectively. The offsetting movements of these liabilities are recorded in Other (income) expense on the Consolidated statements of operations. Excluding the separate account gains and losses, Policy benefits were $696 million in 2019, compared with $628 million and $579 million in 2018 and 2017, respectively.

Refer to the respective sections that follow for a discussion of Net investment income, Interest expense, Other (income) expense, Net realized gains and losses, Amortization of purchased intangibles, and Income tax expense.

Segment Operating Results – Years Ended December 31, 2019, 2018, and 2017

We operate through six business segments: North America Commercial P&C Insurance, North America Personal P&C Insurance, North America Agricultural Insurance, Overseas General Insurance, Global Reinsurance, and Life Insurance. In addition, the results of our run-off Brandywine business, including all run-off asbestos and environmental (A&E) exposures, and the results of Westchester specialty operations for 1996 and prior years are presented within Corporate.

North America Commercial P&C Insurance

The North America Commercial P&C Insurance segment comprises operations that provide property and casualty (P&C) insurance and services to large, middle market, and small commercial businesses in the U.S., Canada, and Bermuda. This segment includes our North America Major Accounts and Specialty Insurance division (large corporate accounts and wholesale business), and the North America Commercial Insurance division (principally middle market and small commercial accounts).

				% Change	
(in millions of U.S. dollars, except for percentages)	**2019**	2018	2017	2019 vs. 2018	2018 vs. 2017
Net premiums written	**$ 13,375**	$ 12,485	$ 12,019	7.1%	3.9%
Net premiums earned	**12,922**	12,402	12,191	4.2%	1.7%
Losses and loss expenses	**8,206**	8,000	8,287	2.6%	(3.5)%
Policy acquisition costs	**1,831**	1,829	1,873	0.2%	(2.3)%
Administrative expenses	**1,028**	966	981	6.4%	(1.5)%
Underwriting income	**1,857**	1,607	1,050	15.5%	53.0%
Net investment income	**2,082**	2,033	1,961	2.4%	3.7%
Other (income) expense	**(3)**	(25)	1	(86.5)%	NM
Segment income	**$ 3,942**	$ 3,665	$ 3,010	7.5%	21.8%
Loss and loss expense ratio	**63.5%**	64.5%	68.0%	(1.0) pt	(3.5) pts
Policy acquisition cost ratio	**14.2%**	14.7%	15.4%	(0.5) pts	(0.7) pts
Administrative expense ratio	**7.9%**	7.8%	8.0%	0.1 pts	(0.2) pts
Combined ratio	**85.6%**	87.0%	91.4%	(1.4) pts	(4.4) pts

NM – not meaningful

Premiums
The table below shows the impact of large structured transactions as well as other transactions that are fully earned when written (e.g., audit and retrospective premium adjustments).

(in millions of U.S. dollars)	**2019**	2018	2017
Net premiums fully earned when written	**$ 391**	$ 342	$ 160

2019 vs. 2018
Net premiums written increased $890 million, or 7.1 percent in 2019, reflecting positive rate increases, new business written and strong retention across most retail lines, including property, financial lines, excess casualty, risk management, and commercial package, as well as in our wholesale and high excess Bermuda lines, and in our small commercial businesses.

Net premiums earned increased $520 million, or 4.2 percent in 2019, due to the growth in net premiums written described above.

2018 vs. 2017
Net premiums written increased $466 million, or 3.9 percent in 2018 reflecting positive rate increases, new business written, and strong renewals across a number of lines. Retail casualty and risk management, A&H, retail property, and continued growth in our small commercial business represented $339 million of the $466 million increase. In addition, the year-over-year increase in large structured transactions was $195 million. This growth was partially offset by merger-related underwriting actions of $123 million and premium reductions from planned portfolio management in our retail and wholesale brokerage financial lines ($62 million).

Net premiums earned increased $211 million, or 1.7 percent in 2018 principally reflecting the net premiums written increases described above and the year-over-year increase in large structured transactions ($163 million), a number of which were earned immediately when written as they were retroactive covers.

Combined Ratio
2019 vs. 2018
The loss and loss expense ratio decreased 1.0 percentage point in 2019, primarily due to lower catastrophe losses, partially offset by a change in mix of business and earned price changes modestly below loss trends in certain classes of our business.

The policy acquisition cost ratio decreased 0.5 percentage points in 2019, due to a change in mix of business towards lower acquisition cost ratio lines and increased cessions under certain reinsurance agreements that resulted in higher ceded acquisition cost benefits than in the prior year.

2018 vs. 2017
The loss and loss expense ratio decreased 3.5 percentage points in 2018, primarily due to lower catastrophe losses and integration-related claims handling expense savings realized, partially offset by lower favorable prior period development, higher non-catastrophe losses (0.4 percentage points), and a less favorable adjustment to our claims handling reserve in the current year relative to 2017.

The policy acquisition cost ratio decreased 0.7 percentage points in 2018, due to increased cessions under certain reinsurance agreements that resulted in higher ceded acquisition costs benefits than in the prior year.

The administrative expense ratio decreased 0.2 percentage points in 2018, primarily due to integration-related expense savings realized, higher net profit from our third-party claims administration business, ESIS, and the net favorable impact of one-time expense accrual releases.

Catastrophe Losses and Prior Period Development

(in millions of U.S. dollars)		**2019**		2018		2017
Catastrophe losses (excludes reinstatement premiums)	**$**	**421**	$	579	$	1,220
Favorable prior period development	**$**	**649**	$	610	$	746

Catastrophe losses were primarily from the following events (refer to the table on page 54):

- 2019: Winter-related storms and other severe weather-related events in the U.S., including tornadoes in Texas, Hurricane Dorian, and Tropical Storm Imelda
- 2018: Hurricanes Florence and Michael, and severe weather-related events in the U.S., including California wildfires
- 2017: Hurricanes Harvey, Irma and Maria and severe weather-related events in the U.S., including California wildfires

CAY Loss Ratio excluding Catastrophe Losses

	2019	2018	2017
Loss and loss expense ratio	**63.5 %**	64.5 %	68.0 %
Catastrophe losses	**(3.3)%**	(4.7)%	(10.0)%
Favorable prior period development	**5.1 %**	5.1 %	6.3 %
CAY loss ratio excluding catastrophe losses	**65.3 %**	64.9 %	64.3 %

2019 vs. 2018
The CAY loss ratio excluding catastrophe losses increased 0.4 percentage points for 2019 due to a change in mix of business and earned price changes modestly below loss trends in certain classes of our business.

2018 vs. 2017
The CAY loss ratio excluding catastrophe losses increased 0.6 percentage points for 2018, due to higher year-over-year large loss activity and a less favorable adjustment to our claims handling reserve in the current year relative to 2017, partially offset by integration-related claims handling expense savings realized.

North America Personal P&C Insurance

The North America Personal P&C Insurance segment comprises operations that provide high net worth personal lines products, including homeowners and complementary products such as valuable articles, excess liability, automobile, and recreational marine insurance and services in the U.S. and Canada.

				% Change	
(in millions of U.S. dollars, except for percentages)	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
Net premiums written	**$ 4,787**	$ 4,674	$ 4,533	2.4%	3.1%
Net premiums earned	**4,694**	4,593	4,399	2.2%	4.4%
Losses and loss expenses	**3,043**	3,229	3,265	(5.8)%	(1.1)%
Policy acquisition costs	**948**	939	899	1.0%	4.4%
Administrative expenses	**286**	269	264	6.0%	1.9%
Underwriting income (loss)	**417**	156	(29)	167.2%	NM
Net investment income	**258**	236	226	9.2%	4.4%
Other (income) expense	**3**	1	4	117.1%	(75.0)%
Amortization of purchased intangibles	**12**	13	16	(11.1)%	(18.8)%
Segment income	**$ 660**	$ 378	$ 177	74.7%	113.6%
Loss and loss expense ratio	**64.8%**	70.3%	74.2%	(5.5) pts	(3.9) pts
Policy acquisition cost ratio	**20.2%**	20.4%	20.4%	(0.2) pts	—
Administrative expense ratio	**6.1%**	5.9%	6.1%	0.2 pts	(0.2) pts
Combined ratio	**91.1%**	96.6%	100.7%	(5.5) pts	(4.1) pts

NM – not meaningful

Premiums
2019 vs. 2018
Net premiums written increased $113 million, or 2.4 percent for 2019, primarily due to strong retention and rate and exposure increases across most lines, partially offset by a $44 million benefit in 2018 related to the harmonization of our legacy premium registration systems, which unfavorably impacted growth by approximately 0.9 percentage points.

Net premiums earned increased $101 million, or 2.2 percent for 2019, reflecting the growth in net premiums written described above.

2018 vs. 2017
Net premiums written increased $141 million, or 3.1 percent for 2018, primarily due to strong retention and new business growth in homeowners and complementary products such as automobiles and valuables. In addition, the non-renewal of a quota share treaty in the second quarter of 2017 covering the acquired Fireman's Fund homeowners and automobile businesses added $47 million of additional net premiums written in 2018. These increases were partially offset by the addition of California to the homeowners quota share reinsurance treaty, effective October 1, 2018 ($47 million), which included a non-recurring unearned premium reserves (UPR) transfer of $32 million.

Net premiums earned increased $194 million, or 4.4 percent for 2018, primarily due to the factors described above.

Combined Ratio
2019 vs. 2018
The loss and loss expense ratio decreased 5.5 percentage points in 2019, primarily due to lower catastrophe losses and favorable prior period development in the current year compared to unfavorable prior period development in the prior year. Additionally, the prior year underlying loss ratio was elevated principally due to increased frequency and severity, primarily non-catastrophe water and fire losses in our homeowners business.

The policy acquisition cost ratio decreased 0.2 percentage points in 2019, primarily due to higher ceded commission benefits.

2018 vs. 2017
The loss and loss expense ratio decreased 3.9 percentage points in 2018, primarily due to lower catastrophe losses (6.5 percentage points), lower unfavorable prior period development (0.6 percentage points), and integration-related claims handling expense savings realized. These decreases were offset by increased frequency and severity of homeowners losses primarily non-catastrophe water related events and large fire losses which are trending above our expectations (3.3 percentage points).

The policy acquisition cost ratio remained flat in 2018. The administrative expense ratio decreased 0.2 percentage points in 2018, primarily due to integration-related expense savings realized that exceeded normal merit and inflation.

Catastrophe Losses and Prior Period Development

(in millions of U.S. dollars)	**2019**	2018	2017
Catastrophe losses (excludes reinstatement premiums)	**$ 543**	$ 611	$ 871
Favorable (unfavorable) prior period development	**$ 95**	$ (41)	$ (69)

Catastrophe losses were primarily from the following events (refer to the table on page 54):
- 2019: Winter-related storms and other severe weather-related events in the U.S., including tornadoes in Texas, California wildfires and Hurricane Dorian
- 2018: Colorado rain and hailstorms, Hurricanes Florence and Michael, California mudslides, and other severe weather-related events in the U.S., including California wildfires
- 2017: Hurricanes Harvey and Irma and severe weather-related events in the U.S., including California wildfires

CAY Loss Ratio excluding Catastrophe Losses

	2019	2018	2017
Loss and loss expense ratio	**64.8 %**	70.3 %	74.2 %
Catastrophe losses	**(11.6)%**	(13.6)%	(20.1)%
Favorable (unfavorable) prior period development	**1.9 %**	(0.9)%	(1.5)%
CAY loss ratio excluding catastrophe losses	**55.1 %**	55.8 %	52.6 %

2019 vs. 2018
The CAY loss ratio excluding catastrophe losses decreased 0.7 percentage points in 2019. The prior year underlying loss ratio was elevated, principally due to increased frequency and severity, primarily non-catastrophe water and fire losses in our homeowners business.

2018 vs. 2017
The CAY loss ratio excluding catastrophe losses increased 3.2 percentage points in 2018, due to increased frequency and severity of homeowners losses primarily non-catastrophe water related events and large fire losses.

North America Agricultural Insurance

The North America Agricultural Insurance segment comprises our North American based businesses that provide a variety of coverages in the U.S. and Canada including crop insurance, primarily Multiple Peril Crop Insurance (MPCI) and crop-hail through Rain and Hail Insurance Service, Inc. (Rain and Hail) as well as farm and ranch and specialty P&C commercial insurance products and services through our Chubb Agribusiness unit.

				% Change	
(in millions of U.S. dollars, except for percentages)	**2019**	2018	2017	2019 vs. 2018	2018 vs. 2017
Net premiums written	**$ 1,810**	$ 1,577	$ 1,516	14.8%	4.0%
Net premiums earned	**1,795**	1,569	1,508	14.4%	4.1%
Adjusted losses and loss expenses	**1,616**	1,114	1,043	45.1%	6.8%
Policy acquisition costs	**84**	79	81	6.8%	(2.5)%
Administrative expenses	**6**	(9)	(8)	NM	12.5%
Underwriting income	**89**	385	392	(77.0)%	(1.8)%
Net investment income	**30**	28	25	5.0%	12.0%
Other (income) expense	**1**	2	2	(33.6)%	—
Amortization of purchased intangibles	**28**	28	29	(2.0)%	(3.4)%
Segment income	**$ 90**	$ 383	$ 386	(76.6)%	(0.8)%
Loss and loss expense ratio	**90.1%**	71.0 %	69.2 %	19.1 pts	1.8 pts
Policy acquisition cost ratio	**4.7%**	5.0 %	5.4 %	(0.3) pts	(0.4) pts
Administrative expense ratio	**0.3%**	(0.5)%	(0.6)%	0.8 pts	0.1 pts
Combined ratio	**95.1%**	75.5 %	74.0 %	19.6 pts	1.5 pts

NM – not meaningful

Premiums
2019 vs. 2018
Net premiums written increased $233 million, or 14.8 percent in 2019, primarily due to growth in our MPCI business and growth in our Chubb Agribusiness. Growth in our MPCI premium was driven primarily by higher retention as a result of the premium sharing formulas under the U.S. government, as well as the non-renewal of a quota-share treaty effective with the current crop year and an increase in current year production. Under the MPCI premium sharing formula under the U.S. government, we cede additional premiums to the government during profitable years. In 2018, the program was more profitable which resulted in higher cessions compared to 2019.

Net premiums earned increased $226 million, or 14.4 percent in 2019, reflecting the growth in net premiums written described above.

2018 vs. 2017
Net premiums written increased $61 million, or 4.0 percent in 2018, primarily due to growth in our MPCI business and growth in our Chubb Agribusiness. The growth in MPCI premium was driven by policy count growth and the year-over-year impact of the premium sharing formulas under the U.S. government. In 2017, the program was more profitable which resulted in higher cessions compared to 2018. The increase was partially offset by lower volatility factors, which are a component of the policy pricing that measures the likelihood the commodity price will fluctuate over the crop year and reduces the premium we charge.

Net premiums earned increased $61 million, or 4.1 percent in 2018, due to the factors described above.

Combined Ratio

2019 vs. 2018

The loss and loss expense ratio increased 19.1 percentage points in 2019, principally due to lower favorable prior period development and the downward revision in the 2019 crop year margin estimate reflecting preventive planting claims due to the impact of wet weather conditions and crop yield shortfalls resulting from poor growing conditions. The increase in the loss ratio was partially offset by lower catastrophe losses.

The policy acquisition cost ratio decreased 0.3 percentage points in 2019, primarily due to lower agent profit sharing commission.

The administrative expense ratio increased 0.8 percentage points in 2019, primarily due to a reduction in the current year Administrative and Operating (A&O) reimbursements on the MPCI business we received under the government program and normal operating expense and inflationary increases.

2018 vs. 2017

The loss and loss expense ratio increased 1.8 percentage points in 2018 due to higher catastrophe losses and lower favorable prior period development.

The policy acquisition cost ratio decreased 0.4 percentage points in 2018 due to lower MPCI reinsurance cessions in the current year.

Catastrophe Losses and Prior Period Development

(in millions of U.S. dollars)	**2019**	2018	2017
Catastrophe losses (excludes reinstatement premiums)	**$ 8**	$ 21	$ 18
Favorable prior period development	**$ 80**	$ 110	$ 119

Catastrophe losses in 2019, 2018, and 2017 were primarily from severe weather-related events in the U.S. in our farm, ranch and specialty P&C businesses. Refer to the table on page 54.

Net favorable prior period development was $80 million, $110 million, and $119 million in 2019, 2018, and 2017, respectively. For 2019, the prior period development amount included $103 million of favorable incurred losses and $13 million of lower acquisition costs due to lower than expected MPCI losses for the 2018 crop year, partially offset by a $36 million decrease in net premiums earned related to the MPCI profit and loss calculation formula. For 2018, the prior period development amount included $140 million of favorable incurred losses and $10 million of lower acquisition costs due to lower than expected MPCI losses for the 2017 crop year, partially offset by a $40 million decrease in net premiums earned related to the MPCI profit and loss calculation formula.

CAY Loss Ratio excluding Catastrophe Losses

	2019	2018	2017
Loss and loss expense ratio	**90.1 %**	71.0 %	69.2 %
Catastrophe losses	**(0.5)%**	(1.3)%	(1.2)%
Favorable prior period development	**3.9 %**	7.0 %	8.2 %
CAY loss ratio excluding catastrophe losses	**93.5 %**	76.7 %	76.2 %

2019 vs. 2018

The CAY loss ratio excluding catastrophe losses increased 16.8 percentage points in 2019, principally due to the downward revision in the 2019 crop year margin estimate reflecting preventive planting claims due to the impact of wet weather conditions and crop yield shortfalls resulting from poor growing conditions.

2018 vs. 2017

The CAY loss ratio excluding catastrophe losses increased 0.5 percentage points in 2018, primarily due to a less favorable crop margin in the current year versus 2017, partially offset by lower underlying losses in our Chubb Agribusiness unit.

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Overseas General Insurance

Overseas General Insurance segment comprises Chubb International and Chubb Global Markets (CGM). Chubb International comprises our international commercial P&C traditional and specialty lines serving large corporations, middle market and small customers; A&H and traditional and specialty personal lines business serving local territories outside the U.S., Bermuda, and Canada. CGM, our London-based international commercial P&C excess and surplus lines business, includes Lloyd's of London (Lloyd's) Syndicate 2488. Chubb provides funds at Lloyd's to support underwriting by Syndicate 2488 which is managed by Chubb Underwriting Agencies Limited.

(in millions of U.S. dollars, except for percentages)	2019	2018	2017	% Change 2019 vs. 2018	% Change 2018 vs. 2017
Net premiums written	**$ 9,262**	$ 8,902	$ 8,350	4.0%	6.6%
Net premiums earned	**8,882**	8,612	8,131	3.1%	5.9%
Losses and loss expenses	**4,606**	4,429	4,281	4.0%	3.5%
Policy acquisition costs	**2,501**	2,346	2,221	6.6%	5.6%
Administrative expenses	**1,033**	1,014	982	1.9%	3.3%
Underwriting income	**742**	823	647	(9.8)%	27.2%
Net investment income	**588**	619	610	(5.1)%	1.5%
Other (income) expense	**12**	—	(4)	NM	NM
Amortization of purchased intangibles	**45**	41	45	8.3%	(8.9)%
Segment income	**$ 1,273**	$ 1,401	$ 1,216	(9.2)%	15.2%
Net premiums written - constant dollars (1)				8.4%	5.3%
Net premiums earned - constant dollars (1)				7.6%	4.7%
Underwriting income - constant dollars (1)				(3.7)%	24.1%
Loss and loss expense ratio	**51.9%**	51.4%	52.6%	0.5 pts	(1.2) pts
Policy acquisition cost ratio	**28.1%**	27.2%	27.3%	0.9 pts	(0.1) pts
Administrative expense ratio	**11.6%**	11.8%	12.1%	(0.2) pts	(0.3) pts
Combined ratio	**91.6%**	90.4%	92.0%	1.2 pts	(1.6) pts

NM – not meaningful

Net Premiums Written by Region

(in millions of U.S. dollars, except for percentages)	2019	2018	2017	C$ (1) 2018	% Change 2019 vs. 2018	% Change C$ (1) 2019 vs. 2018	% Change 2018 vs. 2017
Region							
Europe	**$ 3,631**	$ 3,508	$ 3,281	$ 3,357	3.5%	8.2%	6.9 %
Latin America	**2,277**	2,181	2,108	2,059	4.4%	10.6%	3.5 %
Asia	**3,021**	2,884	2,596	2,806	4.7%	7.6%	11.1 %
Other (2)	**333**	329	365	318	1.1%	4.8%	(9.9)%
Net premiums written	**$ 9,262**	$ 8,902	$ 8,350	$ 8,540	4.0%	8.4%	6.6 %

	2019 % of Total	2018 % of Total	2017 % of Total
Region			
Europe	**38%**	39%	40%
Latin America	**25%**	25%	25%
Asia	**33%**	32%	31%
Other (2)	**4%**	4%	4%
Net premiums written	**100%**	100%	100%

(1) On a constant-dollar basis. Amounts are calculated by translating prior period results using the same local currency rates as the comparable current period.
(2) Comprises Combined International, Eurasia and Africa region, and other international.

Premiums

2019 vs. 2018

Net premiums written increased $360 million in 2019, or $722 million on a constant-dollar basis, reflecting growth across all regions and most lines of business. P&C lines growth was across all regions and was principally due to positive rate increases and new business in property, casualty, and financial lines. Personal lines growth was driven by new business principally in Latin America and Europe. Accident and health (A&H) lines growth was principally in Asia and Latin America driven by new business.

Net premiums earned increased $270 million in 2019, or $629 million on a constant-dollar basis, reflecting the increase in net premiums written.

2018 vs. 2017

Net premiums written increased $552 million in 2018, or $448 million on a constant-dollar basis, reflecting growth across most regions and lines of business. P&C lines growth was across all regions, principally in small commercial property and general casualty lines reflecting new business, and in middle market driven by new business and rate increases. Personal lines growth was principally in our automobile line in Mexico driven by new business, as well as in our specialty lines in Asia. A&H lines growth was principally in Asia driven by new business.

Net premiums earned increased $481 million in 2018, or $384 million on a constant-dollar basis, due to the factors described above.

Combined Ratio

2019 vs. 2018

The loss and loss expense ratio increased 0.5 percentage points in 2019 due to lower favorable prior period development, partially offset by lower catastrophe losses, earned price changes modestly above loss trends, favorable loss experience in certain personal lines, and a change in mix of business towards products and regions that have a lower loss and loss expense ratio and a higher policy acquisition cost ratio.

The policy acquisition cost ratio increased 0.9 percentage points in 2019 due to a change in mix of business towards products and regions that have a higher policy acquisition cost ratio and lower loss and loss expense ratio as noted above, higher underwriting costs resulting from the successful acquisition of business, and higher commissions paid on certain personal lines due to favorable loss experience.

2018 vs. 2017

The loss and loss expense ratio decreased 1.2 percentage points in 2018, reflecting lower catastrophe losses (1.6 percentage points) and a change in the mix of business towards consumer and property and casualty lines in countries that have a lower loss ratio and a higher acquisition cost ratio (0.3 percentage points), partially offset by lower favorable prior period development in 2018 (0.6 percentage points).

The policy acquisition cost ratio was relatively flat in 2018.

The administrative expense ratio decreased 0.3 percentage points in 2018, primarily driven by integration-expense savings realized (0.3 percentage points).

Catastrophe Losses and Prior Period Development

(in millions of U.S. dollars)	**2019**	2018	2017
Catastrophe losses (excludes reinstatement premiums)	**$ 152**	$ 206	$ 331
Favorable prior period development	**$ 92**	$ 212	$ 252

Catastrophe losses were primarily from the following events (refer to the table on page 54):
- 2019: Typhoons Faxai and Hagibis; Hurricane Dorian; storms in Australia; civil unrest in Hong Kong and Chile; and other international weather-related events
- 2018: Typhoons Jebi, Mangkhut and Trami; Hurricane Florence and storms in Australia
- 2017: Hurricanes Harvey, Irma and Maria; Earthquakes in Mexico, Cyclone Debbie in Australia, and flooding in Latin America

CAY Loss Ratio excluding Catastrophe Losses

	2019	2018	2017
Loss and loss expense ratio	**51.9 %**	51.4 %	52.6 %
Catastrophe losses	**(1.8)%**	(2.4)%	(4.0)%
Favorable prior period development	**1.1 %**	2.5 %	3.1 %
CAY loss ratio excluding catastrophe losses	**51.2 %**	51.5 %	51.7 %

2019 vs. 2018
The CAY loss ratio excluding catastrophe losses decreased 0.3 percentage points in 2019 primarily due to earned price changes modestly above loss trends, favorable loss experience in certain personal lines, and a change in mix of business towards products and regions that have a lower loss and loss expense ratio and a higher policy acquisition cost ratio.

2018 vs. 2017
The CAY loss ratio excluding catastrophe losses decreased 0.2 percentage points in 2018 primarily due to a change in the mix of business towards consumer and property and casualty lines in countries that have a lower loss ratio and a higher acquisition cost ratio.

Global Reinsurance

The Global Reinsurance segment represents our reinsurance operations comprising Chubb Tempest Re Bermuda, Chubb Tempest Re USA, Chubb Tempest Re International, and Chubb Tempest Re Canada. Global Reinsurance markets its reinsurance products worldwide primarily through reinsurance brokers under the Chubb Tempest Re brand name and provides a broad range of traditional and non-traditional reinsurance coverage to a diverse array of primary P&C companies.

				% Change	
(in millions of U.S. dollars, except for percentages)	**2019**	2018	2017	2019 vs. 2018	2018 vs. 2017
Net premiums written	**$ 649**	$ 671	$ 685	(3.2)%	(2.1)%
Net premiums earned	**654**	670	704	(2.3)%	(4.9)%
Losses and loss expenses	**352**	479	561	(26.5)%	(14.7)%
Policy acquisition costs	**169**	162	177	4.2%	(8.4)%
Administrative expenses	**35**	41	44	(12.7)%	(8.4)%
Underwriting income (loss)	**98**	(12)	(78)	NM	84.8%
Net investment income	**220**	257	273	(14.4)%	(6.1)%
Other (income) expense	**(58)**	(32)	(1)	80.6%	NM
Segment income	**$ 376**	$ 277	$ 196	35.7%	41.3%
Net premiums written - constant dollars (1)				(1.7)%	(3.3)%
Net premiums earned - constant dollars (1)				(0.8)%	(6.0)%
Underwriting income - constant dollars (1)				NM	84.0%
Loss and loss expense ratio	**53.9%**	71.6%	79.8%	(17.7) pts	(8.2) pts
Policy acquisition cost ratio	**25.7%**	24.2%	25.1%	1.5 pts	(0.9) pts
Administrative expense ratio	**5.4%**	6.0%	6.3%	(0.6) pts	(0.3) pts
Combined ratio	**85.0%**	101.8%	111.2%	(16.8) pts	(9.4) pts

NM – not meaningful
(1) On a constant-dollar basis. Amounts are calculated by translating prior period results using the same local currency rates as the comparable current period.

Premiums
2019 vs. 2018
Net premiums written decreased $22 million in 2019, or $12 million on a constant-dollar basis, as an increase in new business written in property and marine lines was more than offset by an increase in ceded retrocessions, reductions in the international motor line, and higher reinstatement premiums collected in the prior year.

Net premiums earned decreased $16 million in 2019, or $5 million on a constant-dollar basis, reflecting the decrease in net premiums written described above.

2018 vs. 2017
Net premiums written decreased $14 million in 2018, or $22 million on a constant-dollar basis, primarily due to higher reinstatement premiums collected in the prior year principally relating to the 2017 natural catastrophes ($15 million year-over-year decrease) and lower renewals, which is reflective of competitive market conditions primarily in catastrophe and catastrophe exposed lines of business, partially offset by new business written in the casualty line of business.

Net premiums earned decreased $34 million in 2018, or $42 million on a constant-dollar basis, reflecting the decrease in net premiums written. The decrease was also due to $14 million of short-term treaties (less than one year in duration) earned in the prior year that were written in 2016 and 2017.

Combined Ratio
2019 vs. 2018
The loss and loss expense ratio decreased 17.7 percentage points in 2019 primarily due to lower catastrophe losses, partially offset by lower favorable prior period development.

The policy acquisition cost ratio increased 1.5 percentage points in 2019 primarily due to higher commissions paid on property and motor lines treaties with adjustable commission features, and higher reinstatement premiums collected in the prior year which have a lower acquisition cost.

The administrative expense ratio decreased 0.6 percentage points in 2019 primarily driven by lower variable costs.

2018 vs. 2017
The loss and loss expense ratio decreased 8.2 percentage points in 2018 principally due to lower catastrophe losses partially offset by lower favorable prior period development and a shift in the mix of business from property catastrophe business towards casualty business, which generally has a higher loss ratio.

The policy acquisition cost ratio decreased 0.9 percentage points in 2018 primarily due to lower acquisition expenses from proportional business sold.

The administrative expense ratio decreased 0.3 percentage points in 2018 primarily due to continued expense management.

Catastrophe Losses and Prior Period Development

(in millions of U.S dollars)		**2019**		2018		2017
Catastrophe losses (excludes reinstatement premiums)	**$**	**51**	$	205	$	313
Favorable prior period development	**$**	**29**	$	50	$	59

Catastrophe losses were primarily from the following events (refer to the table on page 54):
- 2019: Typhoons Hagibis and Faxai; Hurricane Dorian, and other severe weather-related events primarily in the U.S.
- 2018: Hurricanes Florence and Michael; Typhoons Jebi and Trami; Windstorm Friederike, California Wildfires, and severe weather-related events in the U.S., Canada and Japan
- 2017: Hurricanes Harvey, Irma and Maria; Northern California Wildfires, and severe weather-related events in the U.S.

CAY Loss Ratio excluding Catastrophe Losses

	2019	2018	2017
Loss and loss expense ratio	**53.9 %**	71.6 %	79.8 %
Catastrophe losses	**(7.6)%**	(29.2)%	(42.4)%
Favorable prior period development	**4.3 %**	8.1 %	8.6 %
CAY loss ratio excluding catastrophe losses	**50.6 %**	50.5 %	46.0 %

The CAY loss ratio excluding catastrophe losses remained relatively flat in 2019. The CAY loss ratio excluding catastrophe losses increased 4.5 percentage points in 2018 primarily due to a shift in the mix of business from property catastrophe business towards casualty business which generally has a higher loss ratio and higher losses in our U.S. property lines.

Life Insurance

The Life Insurance segment comprises Chubb's international life operations, Chubb Tempest Life Re (Chubb Life Re), and the North American supplemental A&H and life business of Combined Insurance.

				% Change	
(in millions of U.S. dollars, except for percentages)	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
Net premiums written	**$ 2,392**	$ 2,270	$ 2,141	5.3 %	6.1%
Net premiums earned	**2,343**	2,218	2,101	5.6 %	5.6%
Losses and loss expenses	**757**	766	739	(1.1)%	3.7%
Adjusted policy benefits	**696**	628	579	10.8 %	8.5%
Policy acquisition costs	**620**	557	530	11.2 %	5.1%
Administrative expenses	**323**	310	303	4.5 %	2.3%
Net investment income	**373**	341	313	9.2 %	8.9%
Life Insurance underwriting income	**320**	298	263	6.9 %	13.3%
Other (income) expense	**(48)**	(12)	13	NM	NM
Amortization of purchased intangibles	**2**	2	2	—	—
Segment income	**$ 366**	$ 308	$ 248	18.6 %	24.2%
Net premiums written - constant dollars (1)				6.4 %	5.7%
Net premiums earned - constant dollars (1)				6.6 %	5.3%
Life Insurance underwriting income - constant dollars (1)				8.1 %	13.9%

NM – not meaningful

(1) On a constant-dollar basis. Amounts are calculated by translating prior period results using the same local currency rates as the comparable current period.

Premiums
2019 vs. 2018
Net premiums written increased $122 million in 2019, or $143 million on a constant-dollar basis, primarily reflecting growth in our Asian and Latin American international life operations and North American Combined Insurance supplemental A&H program, partially offset by our life reinsurance business, which continues to decline as no new life reinsurance business is being written.

2018 vs. 2017
Net premiums written increased $129 million in 2018, or $123 million on a constant-dollar basis, primarily due to growth in our North American Combined Insurance supplemental A&H program business, and Asian and Latin American international life operations, partially offset by our life reinsurance business, which continues to decline as no new life reinsurance business is being written.

Deposits
The following table presents deposits collected on universal life and investment contracts:

(in millions of U.S. dollars, except for percentages)		2019		2018		2017	% Change 2019 vs. 2018	% Change C$ (1) 2019 vs. 2018	% Change 2018 vs. 2017
Deposits collected on universal life and investment contracts	**$**	**1,463**	$	1,538	$	1,436	(4.9)%	(2.3)%	7.1%

(1) On a constant-dollar basis. Amounts are calculated by translating prior period results using the same local currency rates as the comparable current period.

Deposits collected on universal life and investment contracts (life deposits) are not reflected as revenues in our Consolidated statements of operations in accordance with GAAP. New life deposits are an important component of production, and although they do not significantly affect current period income from operations they are key to our efforts to grow our business. Life deposits collected decreased in 2019 due to declines in Taiwan, driven by competitive market conditions, and Hong Kong, due to the civil unrest negatively impacting growth in the second half of the year, partially offset by growth in Vietnam. Foreign exchange unfavorably impacted growth by $40 million in 2019.

Life deposits collected increased in 2018 due to growth in Korea, Taiwan, and Vietnam. Foreign exchange favorably impacted growth by $14 million in 2018.

Life Insurance underwriting income and Segment income
2019 vs. 2018
Life Insurance underwriting income increased $22 million in 2019 compared to 2018, principally reflecting an increase in net investment income, partially offset by a favorable reserve development in the prior year. Additionally, segment income benefited from other income of $48 million in 2019 compared to $12 million in 2018, principally due to our share of net income from Huatai Life, our partially-owned life insurance entity in China.

2018 vs. 2017
Life Insurance underwriting income increased $35 million in 2018 compared to 2017 primarily due to an increase in net investment income as well as growth as described above.

Corporate

Corporate results primarily include the results of our non-insurance companies, income and expenses not attributable to reportable segments and loss and loss expenses of asbestos and environmental (A&E) liabilities and certain other non-A&E run-off exposures.

Our exposure to A&E claims principally arises out of liabilities acquired when we purchased Westchester Specialty in 1998, CIGNA's P&C business in 1999, and legacy Chubb Corp A&E claims in 2016. Corporate staff expenses and net investment income of Chubb Limited, including the amortization of the fair value adjustment on acquired invested assets and debt, interest expense, amortization of purchased intangibles related to the Chubb Corp acquisition, and Chubb integration expenses are reported within Corporate.

				% Change	
(in millions of U.S. dollars, except for percentages)	**2019**	2018	2017	2019 vs. 2018	2018 vs. 2017
Losses and loss expenses	**$ 158**	$ 53	$ 285	203.0 %	(81.4)%
Administrative expenses	**319**	295	267	8.1 %	10.5 %
Underwriting loss	**477**	348	552	36.6 %	(37.0)%
Net investment income (loss)	**(125)**	(209)	(283)	(40.5)%	(26.1)%
Interest expense	**552**	641	607	(13.9)%	5.6 %
Adjusted net realized gains (losses)	**(522)**	(649)	91	(19.7)%	NM
Other (income) expense	**(459)**	(406)	(318)	12.6 %	27.7 %
Amortization of purchased intangibles	**218**	255	168	(14.3)%	51.8 %
Chubb integration expenses	**23**	59	310	(61.7)%	(81.0)%
Income tax expense (benefit)	**795**	695	(139)	14.4 %	NM
Net loss	**$ (2,253)**	$ (2,450)	$ (1,372)	(8.1)%	78.6 %

NM – not meaningful

Losses and loss expenses in 2019, 2018, and 2017 were primarily from adverse development relating to our Brandywine asbestos and environmental exposures, non-A&E run-off casualty exposure, including workers' compensation, and unallocated loss adjustment expenses of the A&E claims operations. In addition, 2018 included favorable reinsurance settlements of $205 million. Refer to Note 7 of the Consolidated Financial Statements for further information.

Administrative expenses increased $24 million and $28 million in 2019 and 2018, respectively, primarily due to higher global advertising expenses.

Chubb integration expenses are one-time in nature and are not related to the on-going business activities of the segments. The Chief Executive Officer does not manage segment results or allocate resources to segments when considering these costs and they are therefore excluded from our definition of segment income. Chubb integration expenses in 2019 principally consisted of small residual items related to the Chubb acquisition. Chubb integration expenses for 2018 were $59 million and principally consisted of personnel-related expenses ($18 million) and rebranding ($14 million).

Refer to the respective sections that follow for a discussion of Net investment income, Interest expense, Other (income) expense, Net realized gains and losses, Amortization of purchased intangibles, and Income tax expense.

Effective income tax rate
Our effective income tax rate reflects a mix of income or losses in jurisdictions with a wide range of tax rates, permanent differences between US GAAP and local tax laws, and the timing of recording discrete items. A change in the geographic mix of earnings could impact our effective tax rate.

In 2019, 2018, and 2017, our effective income tax rate was 15.1 percent, 14.9 percent, and (3.7) percent, respectively. The effective income tax rate in 2018 was favorably impacted by an increase to the provisional benefit recorded related to the impact of the 2017 Tax Act. The effective income tax rate in 2017 included the favorable income tax benefit of $450 million, which represented our best estimate of the impact of the 2017 Tax Act. In addition, the income tax benefit in 2017 reflected the significant catastrophe losses in the year.

The 2017 Tax Act included provisions for Global Intangible Low-Taxed Income (GILTI) under which taxes may be imposed on income of foreign subsidiaries and for a Base Erosion and Anti-Abuse Tax (BEAT) under which taxes may be imposed on certain payments to affiliated foreign companies. There remain substantial uncertainties in the interpretation of GILTI and BEAT and portions of the formal guidance issued to date are still in part in proposed form. Finalization of the proposed guidance, and changes to the interpretations and assumptions related to these provisions may impact amounts recorded with respect to the international provisions of the 2017 Tax Act, which may be material in the period the adjustment is recorded. Refer to Note 8 to the Consolidated Financial Statements for additional information on the 2017 Tax Act.

Our effective income tax rate reflects the lower corporate tax rates that prevailed outside the United States on income attributed to certain foreign operations, including 7.83 percent in Switzerland and 0.0 percent in Bermuda. During 2019, approximately 42 percent of our total pre-tax income was tax effected based on these lower rates compared with 49 percent and 62 percent in 2018 and 2017, respectively.

Non-GAAP Reconciliation

In presenting our results, we included and discussed certain non-GAAP measures. These non-GAAP measures, which may be defined differently by other companies, are important for an understanding of our overall results of operations and financial condition. However, they should not be viewed as a substitute for measures determined in accordance with generally accepted accounting principles (GAAP).

Adjusted interest expense and adjusted net investment income are non-GAAP financial measures which exclude amortization of the fair value adjustment on assumed long-term debt and acquired invested assets, respectively, related to the Chubb Corp acquisition due to the size and complexity of this acquisition. Refer to the Interest Expense section for a reconciliation of interest expense to adjusted interest expense.

We provide financial measures, including net premiums written, net premiums earned, and underwriting income on a constant-dollar basis. We believe it is useful to evaluate the trends in our results exclusive of the effect of fluctuations in exchange rates between the U.S. dollar and the currencies in which our international business is transacted, as these exchange rates could fluctuate significantly between periods and distort the analysis of trends. The impact is determined by assuming constant foreign exchange rates between periods by translating prior period results using the same local currency exchange rates as the comparable current period.

Adjusted policy benefits include gains and losses from fair value changes in separate account assets, as well as the offsetting movement in separate account liabilities, for purposes of reporting Life Insurance underwriting income. The gains and losses from fair value changes in separate account assets that do not qualify for separate account reporting under GAAP have been reclassified from Other (income) expense. We view gains and losses from fair value changes in both separate account assets and liabilities as part of the results of our underwriting operations, and therefore these gains and losses are reclassified to adjusted policy benefits.

The following table presents a reconciliation of Policy benefits to Adjusted policy benefits:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Policy benefits	**$ 740**	$ 590	$ 676
Add: (Gains) losses from fair value changes in separate account assets	**(44)**	38	(97)
Adjusted policy benefits	**$ 696**	$ 628	$ 579

P&C performance metrics comprise consolidated operating results (including Corporate) and exclude the operating results of the Life Insurance segment. We believe that these measures are useful and meaningful to investors as they are used by management to assess the company's P&C operations which are the most economically similar. We exclude the Life Insurance segment because the results of this business do not always correlate with the results of our P&C operations.

P&C combined ratio is the sum of the loss and loss expense ratio, acquisition cost ratio and the administrative expense ratio excluding the life business and including the realized gains and losses on the crop derivatives. These derivatives were purchased to provide economic benefit, in a manner similar to reinsurance protection, in the event that a significant decline in commodity pricing impacts underwriting results. We view gains and losses on these derivatives as part of the results of our underwriting operations.

CAY P&C combined ratio excluding catastrophe losses (CATs) excludes CATs and prior period development (PPD) from the P&C combined ratio. We exclude CATs as they are not predictable as to timing and amount and PPD as these unexpected loss developments on historical reserves are not indicative of our current underwriting performance. The combined ratio numerator is adjusted to exclude CATs, net premiums earned adjustments on PPD, prior period expense adjustments and reinstatement premiums on PPD, and the denominator is adjusted to exclude net premiums earned adjustments on PPD and reinstatement premiums on CATs and PPD. In periods where there are adjustments on loss sensitive policies, these adjustments are excluded from PPD and net premiums earned when calculating the ratios. We believe this measure provides a better evaluation of our underwriting performance and enhances the understanding of the trends in our P&C business that may be obscured by these items. This measure is commonly reported among our peer companies and allows for a better comparison.

Reinstatement premiums are additional premiums paid on certain reinsurance agreements in order to reinstate coverage that had been exhausted by loss occurrences. The reinstatement premium amount is typically a pro rata portion of the original ceded premium paid based on how much of the reinsurance limit had been exhausted.

Net premiums earned adjustments within PPD are adjustments to the initial premium earned on retrospectively rated policies based on actual claim experience that develops after the policy period ends. The premium adjustments correlate to the prior period loss development on these same policies and are fully earned in the period the adjustments are recorded.

Prior period expense adjustments typically relate to adjustable commission reserves or policyholder dividend reserves based on actual claim experience that develops after the policy period ends. The expense adjustments correlate to the prior period loss development on these same policies.

For this disclosure purpose, the normalized level of CATs, or expected level of CATs, is not intended to represent a probability weighted expectation for the company but rather to represent management's view of what might be more typical for a given period based on various factors, including historical experience, seasonal patterns, and consideration of both modeled CATs (e.g., windstorm and earthquake) as well as non-modeled CATs (e.g., wildfires, floods and freeze).

The following table presents CATs above (below) expected level and the impact on the combined ratio:

		Year Ended December 31	
(in millions of U.S. dollars, except for percentage points)	**2019**	2018	2017
Actual level of CATs - pre-tax	**$ 1,187**	$ 1,626	$ 2,746
Less: Expected level of CATs - pre-tax	**969**	937	908
CATs above expected level - pre-tax	**$ 218**	$ 689	$ 1,838
Adverse impact of CATs above an expected level on combined ratio	**0.7%**	2.5%	6.8%

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The following tables present the calculation of combined ratio, as reported for each segment to P&C combined ratio, adjusted for catastrophe losses (CATs) and PPD:

For the Year Ended December 31, 2019 (in millions of U.S. dollars except for ratios)		North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Corporate	Total P&C
Numerator								
Losses and loss expenses								
Losses and loss expenses		$ 8,206	$ 3,043	$ 1,608	$ 4,606	$ 352	$ 158	$ 17,973
Realized (gains) losses on crop derivatives		—	—	8	—	—	—	8
Adjusted losses and loss expenses	A	$ 8,206	$ 3,043	$ 1,616	$ 4,606	$ 352	$ 158	$ 17,981
Catastrophe losses and related adjustments								
Catastrophe losses, net of related adjustments		(421)	(554)	(8)	(156)	(48)	—	(1,187)
Reinstatement premiums collected (expensed) on catastrophe losses		—	(11)	—	(4)	3	—	(12)
Catastrophe losses, gross of related adjustments		(421)	(543)	(8)	(152)	(51)	—	(1,175)
PPD and related adjustments								
PPD, net of related adjustments - favorable (unfavorable)		649	95	80	92	29	(153)	792
Net premiums earned adjustments on PPD - unfavorable (favorable)		38	—	36	—	1	—	75
Expense adjustments - unfavorable (favorable)		(3)	—	(13)	—	(1)	—	(17)
PPD reinstatement premiums - unfavorable (favorable)		(1)	(4)	—	1	(1)	—	(5)
PPD, gross of related adjustments - favorable (unfavorable)		683	91	103	93	28	(153)	845
CAY loss and loss expense ex CATs	B	$ 8,468	$ 2,591	$ 1,711	$ 4,547	$ 329	$ 5	$ 17,651
Policy acquisition costs and administrative expenses								
Policy acquisition costs and administrative expenses	C	$ 2,859	$ 1,234	$ 90	$ 3,534	$ 204	$ 319	$ 8,240
Expense adjustments - favorable (unfavorable)		3	—	13	—	1	—	17
Policy acquisition costs and administrative expenses, adjusted	D	$ 2,862	$ 1,234	$ 103	$ 3,534	$ 205	$ 319	$ 8,257
Denominator								
Net premiums earned	E	$ 12,922	$ 4,694	$ 1,795	$ 8,882	$ 654		$ 28,947
Reinstatement premiums (collected) expensed on catastrophe losses		—	11	—	4	(3)		12
Net premiums earned adjustments on PPD - unfavorable (favorable)		38	—	36	—	1		75
PPD reinstatement premiums - unfavorable (favorable)		(1) —	(4)	— —	1	(1)		(5)
Net premiums earned excluding adjustments	F	$ 12,959	$ 4,701	$ 1,831	$ 8,887	$ 651		$ 29,029
P&C Combined ratio								
Loss and loss expense ratio	A/E	63.5%	64.8%	90.1%	51.9%	53.9%		62.1%
Policy acquisition cost and administrative expense ratio	C/E	22.1%	26.3%	5.0%	39.7%	31.1%		28.5%
P&C Combined ratio		85.6%	91.1%	95.1%	91.6%	85.0%		90.6%
CAY P&C Combined ratio ex CATs								
Loss and loss expense ratio, adjusted	B/F	65.3%	55.1%	93.5%	51.2%	50.6%		60.8%
Policy acquisition cost and administrative expense ratio, adjusted	D/F	22.1%	26.3%	5.6%	39.7%	31.5%		28.4%
CAY P&C Combined ratio ex CATs		87.4%	81.4%	99.1%	90.9%	82.1%		89.2%
Combined ratio								
Combined ratio								90.6%
Add: impact of gains and losses on crop derivatives								—
P&C Combined ratio								90.6%

Note: The ratios above are calculated using whole U.S. dollars. Accordingly, calculations using rounded amounts may differ. Letters A, B, C, D, E and F included in the table are references for calculating the ratios above.

For the Year Ended December 31, 2018 (in millions of U.S. dollars except for ratios)		North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Corporate	Total P&C
Numerator								
Losses and loss expenses								
Losses and loss expenses		$ 8,000	$ 3,229	$ 1,111	$ 4,429	$ 479	$ 53	$ 17,301
Realized (gains) losses on crop derivatives		—	—	3	—	—	—	3
Adjusted losses and loss expenses	A	$ 8,000	$ 3,229	$ 1,114	$ 4,429	$ 479	$ 53	$ 17,304
Catastrophe losses and related adjustments								
Catastrophe losses, net of related adjustments		(579)	(637)	(21)	(206)	(183)	—	(1,626)
Reinstatement premiums collected (expensed) on catastrophe losses		—	(26)	—	—	22	—	(4)
Catastrophe losses, gross of related adjustments		(579)	(611)	(21)	(206)	(205)	—	(1,622)
PPD and related adjustments								
PPD, net of related adjustments - favorable (unfavorable)		610	(41)	110	212	50	(45)	896
Net premiums earned adjustments on PPD - unfavorable (favorable)		29	—	40	—	8	—	77
Expense adjustments - unfavorable (favorable)		7	—	(10)	—	(1)	—	(4)
PPD reinstatement premiums - unfavorable (favorable)		7	1	—	4	—	—	12
PPD, gross of related adjustments - favorable (unfavorable)		653	(40)	140	216	57	(45)	981
CAY loss and loss expense ex CATs	B	$ 8,074	$ 2,578	$ 1,233	$ 4,439	$ 331	$ 8	$ 16,663
Policy acquisition costs and administrative expenses								
Policy acquisition costs and administrative expenses	C	$ 2,795	$ 1,208	$ 70	$ 3,360	$ 203	$ 295	$ 7,931
Expense adjustments - favorable (unfavorable)		(7)	—	10	—	1	—	4
Policy acquisition costs and administrative expenses, adjusted	D	$ 2,788	$ 1,208	$ 80	$ 3,360	$ 204	$ 295	$ 7,935
Denominator								
Net premiums earned	E	$ 12,402	$ 4,593	$ 1,569	$ 8,612	$ 670		$ 27,846
Reinstatement premiums (collected) expensed on catastrophe losses		—	26	—	—	(22)		4
Net premiums earned adjustments on PPD - unfavorable (favorable)		29	—	40	—	8		77
PPD reinstatement premiums - unfavorable (favorable)		7	1	—	4	—		12
Net premiums earned excluding adjustments	F	$ 12,438	$ 4,620	$ 1,609	$ 8,616	$ 656		$ 27,939
P&C Combined ratio								
Loss and loss expense ratio	A/E	64.5%	70.3%	71.0%	51.4%	71.6%		62.1%
Policy acquisition cost and administrative expense ratio	C/E	22.5%	26.3%	4.5%	39.0%	30.2%		28.5%
P&C Combined ratio		87.0%	96.6%	75.5%	90.4%	101.8%		90.6%
CAY P&C Combined ratio ex CATs								
Loss and loss expense ratio, adjusted	B/F	64.9%	55.8%	76.7%	51.5%	50.5%		59.6%
Policy acquisition cost and administrative expense ratio, adjusted	D/F	22.4%	26.1%	4.9%	39.0%	31.1%		28.4%
CAY P&C Combined ratio ex CATs		87.3%	81.9%	81.6%	90.5%	81.6%		88.0%
Combined ratio								
Combined ratio								90.6%
Add: impact of gains and losses on crop derivatives								—
P&C Combined ratio								90.6%

Note: The ratios above are calculated using whole U.S. dollars. Accordingly, calculations using rounded amounts may differ. Letters A, B, C, D, E and F included in the table are references for calculating the ratios above.

Net Investment Income

(in millions of U.S. dollars, except for percentages)	**2019**	2018	2017
Average invested assets	**$ 104,074**	$ 101,453	$ 99,675
Net investment income (1)	**$ 3,426**	$ 3,305	$ 3,125
Yield on average invested assets	**3.3%**	3.3%	3.1%
Market yield on fixed maturities	**2.7%**	3.7%	2.9%

(1) Includes $161 million, $248 million and $332 million of amortization expense related to the fair value adjustment of acquired invested assets related to the Chubb Corp acquisition in 2019, 2018 and 2017, respectively.

Net investment income is influenced by a number of factors including the amounts and timing of inward and outward cash flows, the level of interest rates, and changes in overall asset allocation. Net investment income increased 3.6 percent in 2019 compared with 2018, primarily due to higher average invested assets, partially offset by a reduction in the usage of notional cash pooling programs and unfavorable foreign exchange. Net investment income increased 5.8 percent in 2018 compared with 2017, primarily due to higher reinvestment rates offset by lower private equity distributions. Refer to Note 3 g) to the Consolidated Financial Statements for additional information.

For private equities where we own less than three percent, investment income is included within Net investment income in the table above. For private equities where we own more than three percent, investment income is included within Other income (expense) in the Consolidated statements of operations. Excluded from Net investment income is the mark-to-market movement for private equities, which is recorded within either Other income (expense) or Net realized gains (losses) based on our percentage of ownership. The total mark-to-market movement for private equities excluded from Net investment income was as follows:

(in millions of U.S. dollars)	**2019**	2018
Total mark-to-market gain on private equity, pre-tax	**$ 449**	$ 298

Interest Expense

The following table presents our pre-tax interest expense for the years ended December 31, 2019 and 2018. Also presented below is our estimated pre-tax interest expense for the year ended December 31, 2020 based on our existing debt obligations as well as fees based on our expected usage of certain facilities, including letters of credit, collateral fees, and repurchase agreements.

	Estimated Interest Expense					Actual Interest Expense	
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Full Year	**Full Year**	Full Year
(in millions of U.S. dollars)	2020	2020	2020	2020	2020	**2019**	2018
Fixed interest expense based on outstanding debt	$ 123	$ 123	$ 122	$ 118	$ 486	**$ 488**	$ 520
Variable interest expense based on expected usage	18	18	18	18	72	**85**	154
Adjusted interest expense	$ 141	$ 141	$ 140	$ 136	$ 558	**$ 573**	$ 674
Amortization of the fair value of debt assumed in the Chubb Corp acquisition	(5)	(5)	(5)	(6)	(21)	**(21)**	(33)
Total interest expense, including amortization of the fair value of debt	$ 136	$ 136	$ 135	$ 130	$ 537	**$ 552**	$ 641

Estimated 2020 fixed interest expense assumes that the $1.3 billion 2.3 percent senior notes is fully paid in November 2020 at the maturity date. Estimated variable interest expense is based on expected usage and current interest rates and may fluctuate.

Net Realized and Unrealized Gains (Losses)

We take a long-term view with our investment strategy, and our investment managers manage our investment portfolio to maximize total return within certain specific guidelines designed to minimize risk. The majority of our investment portfolio is available for sale and reported at fair value. Our held to maturity investment portfolio is reported at amortized cost.

The effect of market movements on our fixed maturities portfolio impacts Net income (through Net realized gains (losses)) when securities are sold or when we record an Other-than-temporary impairment (OTTI) charge. For a further discussion related to how we assess OTTI for our fixed maturities, including credit-related OTTI, and the related impact on Net income, refer to Note 3 c) to the Consolidated Financial Statements. Additionally, Net income is impacted through the reporting of changes in the fair value of equity securities and private equity securities where we own less than three percent, and derivatives, including financial futures, options, swaps, and GLB reinsurance. Changes in unrealized appreciation and depreciation on available for sale securities resulting from the revaluation of securities held, changes in cumulative foreign currency translation adjustment, and unrealized postretirement benefit obligations liability adjustment, are reported as separate components of Accumulated other comprehensive income (loss) in Shareholders' equity in the Consolidated balance sheets. The following table presents our net realized and unrealized gains (losses):

	Year Ended December 31						
	2019			2018			2017
(in millions of U.S. dollars)	**Net Realized Gains (Losses)**	**Net Unrealized Gains (Losses)**	**Net Impact**	Net Realized Gains (Losses)	Net Unrealized Gains (Losses)	Net Impact	Net Realized Gains (Losses)
Fixed maturities	**$ (31)**	**$ 3,738**	**$ 3,707**	$ (302)	$ (1,996)	$ (2,298)	$ (31)
Fixed income and equity derivatives	**(435)**	**—**	**(435)**	(75)	—	(75)	(11)
Public equity							
Sales	**58**	**—**	**58**	70	—	70	16
Mark-to-market	**46**	**—**	**46**	(129)	—	(129)	—
Private equity (less than 3 percent ownership)							
Sales	**(5)**	**—**	**(5)**	121	—	121	(11)
Mark-to-market	**(15)**	**—**	**(15)**	(126)	—	(126)	—
Total investment portfolio	**(382)**	**3,738**	**3,356**	(441)	(1,996)	(2,437)	(37)
Variable annuity reinsurance derivative transactions, net of applicable hedges	**(142)**	**—**	**(142)**	(252)	—	(252)	103
Other derivatives	**(8)**	**—**	**(8)**	(3)	—	(3)	(5)
Foreign exchange	**7**	**13**	**20**	131	(802)	(671)	36
Other (1)	**(5)**	**(79)**	**(84)**	(87)	(321)	(408)	(13)
Net gains (losses), pre-tax	**$ (530)**	**$ 3,672**	**$ 3,142**	$ (652)	$ (3,119)	$ (3,771)	$ 84

(1) Net unrealized gains (losses) includes our postretirement programs of $(76) million, $(321) million, and $(16) million for the years ended December 31, 2019, 2018, and 2017, respectively.

For the years ended December 31, 2019 and 2018, other-than-temporary impairments in Net realized gains (losses) include $58 million and $49 million, respectively, for fixed maturities.

The variable annuity reinsurance derivative transactions resulted in realized gains (losses), due to the (increase) decrease in the fair value of GLB liabilities of $(4) million, $(248) million, and $364 million for the years ended December 31, 2019, 2018, and 2017, respectively. The realized losses in 2019 reflected an increase in the fair value of GLB liabilities due to lower interest rates and changes made to our valuation model relating to policyholder behavior which was partially offset by higher global equity market levels. The realized losses in 2018 reflected an increase in the fair value of GLB liabilities due to lower global equity market levels, the impact of discounting future claims for one less year and changes made to our valuation model relating to policyholder behavior. In addition, we maintain positions in derivative instruments that decrease in fair value when the S&P 500 index increases. During the years ended December 31, 2019, 2018, and 2017, we experienced realized losses of $138 million, $4 million, and $261 million, respectively, related to these derivative instruments.

Amortization of Purchased Intangibles and Other Amortization

Amortization expense related to purchased intangibles were $305 million, $339 million, and $260 million for the years ended December 31, 2019, 2018, and 2017, respectively, and principally relates to the Chubb Corp acquisition. The decrease in amortization expense of purchased intangibles in 2019 compared to 2018 primarily reflects lower intangible amortization expense related to agency distribution relationships and renewal rights. The increase in 2018 compared to 2017 primarily reflects a lower amortization benefit from the fair value adjustment on unpaid losses and loss expenses. The amortization of purchased intangibles expense in 2020 is expected to be $290 million, or approximately $73 million each quarter.

Reduction of deferred tax liability associated with intangible assets related to Other intangible assets (excluding the fair value adjustment on Unpaid losses and loss expense)

At December 31, 2019, the deferred tax liability associated with the Other intangible assets (excluding the fair value adjustment on Unpaid losses and loss expenses) was $1,347 million.

The following table presents at December 31, 2019, the expected reduction to the deferred tax liability associated with Other intangible assets (which reduces as agency distribution relationships and renewal rights, and other intangible assets amortize), at current foreign currency exchange rates for the next five years:

For the Years Ending December 31 (in millions of U.S. dollars)	Reduction to deferred tax liability associated with intangible assets
2020	$ 72
2021	67
2022	64
2023	60
2024	55
Total	$ 318

Amortization of the fair value adjustment on acquired invested assets and assumed long-term debt

The following table presents at December 31, 2019, the expected amortization expense of the fair value adjustment on acquired invested assets, at current foreign currency exchange rates, and the expected amortization benefit from the amortization of the fair value adjustment on assumed long-term debt for the next five years as follows:

	Amortization (expense) benefit of the fair value adjustment on	
For the Years Ending December 31 (in millions of U.S. dollars)	Acquired invested assets (1)	Assumed long-term debt (2)
2020	$ (130)	$ 21
2021	(110)	21
2022	(92)	21
2023	—	21
2024	—	21
Total	$ (332)	$ 105

(1) Recorded as a reduction to Net investment income in the Consolidated statements of operations.

(2) Recorded as a reduction to Interest expense in the Consolidated statements of operations.

The estimate of amortization expense of the fair value adjustment on acquired invested assets could vary materially based on current market conditions, bond calls, overall duration of the acquired investment portfolio, and foreign exchange.

Investments

Our investment portfolio is invested primarily in publicly traded, investment grade, fixed income securities with an average credit quality of A/Aa as rated by the independent investment rating services Standard and Poor's (S&P)/ Moody's Investors Service (Moody's). The portfolio is externally managed by independent, professional investment managers and is broadly diversified across geographies, sectors, and issuers. Other investments principally comprise direct investments, investment funds, and limited partnerships. We hold no collateralized debt obligations in our investment portfolio, and we provide no credit default protection. We have long-standing global credit limits for our entire portfolio across the organization. Exposures are aggregated, monitored, and actively managed by our Global Credit Committee, comprising senior executives, including our Chief Financial Officer, our Chief Risk Officer, our Chief Investment Officer, and our Treasurer. We also have well-established, strict contractual investment rules requiring managers to maintain highly diversified exposures to individual issuers and closely monitor investment manager compliance with portfolio guidelines. The average duration of our fixed income securities, including the effect of options and swaps, was 3.8 years and 3.7 years at December 31, 2019 and 2018, respectively. We estimate that a 100 basis point (bps) increase in interest rates would reduce the valuation of our fixed income portfolio by approximately $3.9 billion at December 31, 2019.

	December 31, 2019		December 31, 2018	
(in millions of U.S. dollars)	**Fair Value**	**Cost/ Amortized Cost**	Fair Value	Cost/ Amortized Cost
Fixed maturities available for sale	**$ 85,488**	**$ 82,580**	$ 78,470	$ 79,323
Fixed maturities held to maturity	**13,005**	**12,581**	13,259	13,435
Short-term investments	**4,291**	**4,291**	3,016	3,016
	102,784	**99,452**	94,745	95,774
Equity securities	**812**	**812**	770	770
Other investments	**6,062**	**6,062**	5,277	5,277
Total investments	**$ 109,658**	**$ 106,326**	$ 100,792	$ 101,821

The fair value of our total investments increased $8.9 billion during the year ended December 31, 2019, primarily due to unrealized appreciation driven by declining interest rates and the investing of both operating cash flows and net proceeds from debt issuance. This increase was partially offset by the payment of dividends on our Common Shares and share repurchases.

The following tables present the market value of our fixed maturities and short-term investments at December 31, 2019 and 2018. The first table lists investments according to type and the second according to S&P credit rating:

	December 31, 2019		December 31, 2018	
(in millions of U.S. dollars, except for percentages)	**Market Value**	**% of Total**	Market Value	% of Total
Treasury / Agency	**$ 4,630**	**5%**	$ 5,327	6%
Corporate and asset-backed	**34,259**	**33%**	29,091	31%
Mortgage-backed	**21,588**	**21%**	18,026	19%
Municipal	**12,824**	**12%**	16,327	17%
Non-U.S.	**25,192**	**25%**	22,958	24%
Short-term investments	**4,291**	**4%**	3,016	3%
Total	**$ 102,784**	**100%**	$ 94,745	100%
AAA	**$ 15,714**	**15%**	$ 14,571	15%
AA	**37,504**	**37%**	36,715	39%
A	**19,236**	**19%**	17,253	18%
BBB	**13,650**	**13%**	12,035	13%
BB	**9,474**	**9%**	8,363	9%
B	**6,897**	**7%**	5,596	6%
Other	**309**	**—**	212	—
Total	**$ 102,784**	**100%**	$ 94,745	100%

Corporate and asset-backed securities
The following table presents our 10 largest global exposures to corporate bonds by market value at December 31, 2019:

(in millions of U.S. dollars)	Market Value
Wells Fargo & Co	$ 637
Bank of America Corp	575
JP Morgan Chase & Co	568
Comcast Corp	461
HSBC Holdings Plc	396
AT&T Inc	392
Citigroup Inc	392
Verizon Communications Inc	381
Goldman Sachs Group Inc	369
Morgan Stanley	358

Mortgage-backed securities

	S&P Credit Rating					Market Value	Amortized Cost
December 31, 2019 (in millions of U.S. dollars)	AAA	AA	A	BBB	BB and below	Total	Total
Agency residential mortgage-backed (RMBS)	$ 187	$ 17,722	$ —	$ —	$ —	$ 17,909	$ 17,436
Non-agency RMBS	184	32	75	18	10	319	317
Commercial mortgage-backed	2,946	272	136	6	—	3,360	3,290
Total mortgage-backed securities	$ 3,317	$ 18,026	$ 211	$ 24	$ 10	$ 21,588	$ 21,043

Municipal
As part of our overall investment strategy, we may invest in states, municipalities, and other political subdivisions fixed maturity securities (Municipal). We apply the same investment selection process described previously to our Municipal investments. The portfolio is highly diversified primarily in state general obligation bonds and essential service revenue bonds including education and utilities (water, power, and sewers).

Non-U.S.
Our exposure to the Euro results primarily from Chubb European Group SE which is headquartered in France and offers a broad range of coverages throughout the European Union, Central, and Eastern Europe. Chubb primarily invests in Euro denominated investments to support its local currency insurance obligations and required capital levels. Chubb’s local currency investment portfolios have strict contractual investment guidelines requiring managers to maintain a high quality and diversified portfolio to both sector and individual issuers. Investment portfolios are monitored daily to ensure investment manager compliance with portfolio guidelines.

Our non-U.S. investment grade fixed income portfolios are currency-matched with the insurance liabilities of our non-U.S. operations. The average credit quality of our non-U.S. fixed income securities is A and 49 percent of our holdings are rated AAA or guaranteed by governments or quasi-government agencies. Within the context of these investment portfolios, our government and corporate bond holdings are highly diversified across industries and geographies. Issuer limits are based on credit rating (AA—two percent, A—one percent, BBB—0.5 percent of the total portfolio) and are monitored daily via an internal compliance system. We manage our indirect exposure using the same credit rating based investment approach. Accordingly, we do not believe our indirect exposure is material.

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The following table summarizes the market value and amortized cost of our non-U.S. fixed income portfolio by country/sovereign for non-U.S. government securities at December 31, 2019:

(in millions of U.S. dollars)	Market Value	Amortized Cost
Republic of Korea	$ 1,032	$ 920
United Kingdom	924	903
Canada	835	830
Federative Republic of Brazil	688	669
Kingdom of Thailand	652	558
Province of Ontario	644	634
United Mexican States	567	554
Province of Quebec	496	484
Commonwealth of Australia	365	324
Socialist Republic of Vietnam	362	277
Other Non-U.S. Government Securities	4,890	4,706
Total	$ 11,455	$ 10,859

The following table summarizes the market value and amortized cost of our non-U.S. fixed income portfolio by country/sovereign for non-U.S. corporate securities at December 31, 2019:

(in millions of U.S. dollars)	Market Value	Amortized Cost
United Kingdom	$ 2,316	$ 2,224
Canada	1,781	1,735
United States (1)	1,156	1,111
France	1,136	1,088
Australia	813	781
Netherlands	685	656
Japan	587	576
Germany	560	538
Switzerland	511	490
China	371	362
Other Non-U.S. Corporate Securities	3,821	3,673
Total	$ 13,737	$ 13,234

(1) The countries that are listed in the non-U.S. corporate fixed income portfolio above represent the ultimate parent company's country of risk. Non-U.S. corporate securities could be issued by foreign subsidiaries of U.S. corporations.

Below-investment grade corporate fixed income portfolio
Below-investment grade securities have different characteristics than investment grade corporate debt securities. Risk of loss from default by the borrower is greater with below-investment grade securities. Below-investment grade securities are generally unsecured and are often subordinated to other creditors of the issuer. Also, issuers of below-investment grade securities usually have higher levels of debt and are more sensitive to adverse economic conditions, such as recession or increasing interest rates, than investment grade issuers. At December 31, 2019, our corporate fixed income investment portfolio included below-investment grade and non-rated securities which, in total, comprised approximately 14 percent of our fixed income portfolio. Our below-investment grade and non-rated portfolio includes over 1,300 issuers, with the greatest single exposure being $149 million.

We manage high-yield bonds as a distinct and separate asset class from investment grade bonds. The allocation to high-yield bonds is explicitly set by internal management and is targeted to securities in the upper tier of credit quality (BB/B). Our minimum rating for initial purchase is BB/B. Twelve external investment managers are responsible for high-yield security selection and portfolio construction. Our high-yield managers have a conservative approach to credit selection and very low historical default experience. Holdings are highly diversified across industries and generally subject to a 1.5 percent issuer limit as a percentage of high-yield allocation. We monitor position limits daily through an internal compliance system. Derivative and structured securities (e.g., credit default swaps and collateralized loan obligations) are not permitted in the high-yield portfolio.

Asbestos and Environmental (A&E)

Asbestos and environmental (A&E) reserving considerations
For asbestos, Chubb faces claims relating to policies issued to manufacturers, distributors, installers, and other parties in the chain of commerce for asbestos and products containing asbestos. Claimants will generally allege damages across an extended time period which may coincide with multiple policies covering a wide range of time periods for a single insured.

Environmental claims present exposure for remediation and defense costs associated with the contamination of property as a result of pollution.

The following table presents count information for asbestos claims by causative agent and environmental claims by account, for direct policies only:

	Asbestos (by causative agent)		Environmental (by account)	
	2019	2018	**2019**	2018
Open at beginning of year	**1,838**	1,789	**1,361**	1,349
Newly reported/reopened	**173**	188	**140**	149
Closed or otherwise disposed	**287**	139	**284**	137
Open at end of year	**1,724**	1,838	**1,217**	1,361

Survival ratios are calculated by dividing the asbestos or environmental loss and allocated loss adjustment expense (ALAE) reserves by the average asbestos or environmental loss and ALAE payments for the three most recent calendar years (3-year survival ratio). The 3-year survival ratios for gross and net Asbestos loss and ALAE reserves were 5.8 years and 6.0 years, respectively. The 3-year survival ratios for gross and net Environmental loss and ALAE reserves were 4.0 years and 12.1 years, respectively. The net 3-year survival ratios were impacted by favorable reinsurance settlements in 2018. Excluding the settlements, the 3-year survival ratio for net Asbestos loss and ALAE reserves and net Environmental loss and ALAE reserves were 5.7 years and 4.5 years, respectively. Refer to the PPD section in Note 7 to the consolidated financial statements for additional information on the settlements. The survival ratios provide only a very rough depiction of reserves and are significantly impacted by a number of factors such as aggressive settlement practices, variations in gross to ceded relationships within the asbestos or environmental claims, and levels of coverage provided. Therefore, we urge caution in using these very simplistic ratios to gauge reserve adequacy.

Catastrophe Management

We actively monitor and manage our catastrophe risk accumulation around the world such as setting risk limits based on probable maximum loss (PML) and purchasing catastrophe reinsurance. The table below presents our modeled pre-tax estimates of natural catastrophe PML, net of reinsurance, at December 31, 2019, for Worldwide, U.S. hurricane and California earthquake events, based on our in-force portfolio at October 1, 2019 and reflecting the April 1, 2019 reinsurance program (see Natural Catastrophe Property Reinsurance Program section) as well as inuring reinsurance protection coverages. According to the model, for the 1-in-100 return period scenario, there is a one percent chance that our pre-tax annual aggregate losses incurred in any year from U.S. hurricane events could be in excess of $2,685 million (or 4.9 percent of our total shareholders' equity at December 31, 2019). These estimates assume that reinsurance recoverable is fully collectible.

	Modeled Net Probable Maximum Loss (PML) Pre-tax								
	Worldwide (1) Annual Aggregate			U.S. Hurricane (2) Annual Aggregate			California Earthquake (3) Single Occurrence		
(in millions of U.S. dollars, except for percentages)		**Chubb**	**% of Total Shareholders' Equity**		**Chubb**	**% of Total Shareholders' Equity**		**Chubb**	**% of Total Shareholders' Equity**
1-in-10	$	1,873	3.4%	$	1,089	2.0%	$	129	0.2%
1-in-100	$	3,804	6.9%	$	2,685	4.9%	$	1,338	2.4%
1-in-250	$	6,227	11.3%	$	4,698	8.5%	$	1,513	2.7%

(1) Worldwide losses are comprised of losses arising only from hurricanes, typhoons, convective storms and earthquakes and do not include "non-modeled" perils such as wildfire and flood.
(2) U.S. Hurricane losses include losses from wind and storm-surge and exclude rainfall.
(3) California earthquakes include fire-following perils.

The above estimates of Chubb's loss profile are inherently uncertain for many reasons, including the following:
- While the use of third-party catastrophe modeling packages to simulate potential hurricane and earthquake losses is prevalent within the insurance industry, the models are reliant upon significant meteorology, seismology, and engineering assumptions to estimate catastrophe losses. In particular, modeled catastrophe events are not always a representation of actual events and ensuing additional loss potential;
- There is no universal standard in the preparation of insured data for use in the models, the running of the modeling software and interpretation of loss output. These loss estimates do not represent our potential maximum exposures and it is highly likely that our actual incurred losses would vary materially from the modeled estimates; and
- The potential effects of climate change add to modeling complexity.

Natural Catastrophe Property Reinsurance Program

Chubb's core property catastrophe reinsurance program provides protection against natural catastrophes impacting its primary property operations (i.e., excluding our Global Reinsurance and Life Insurance segments).

We regularly review our reinsurance protection and corresponding property catastrophe exposures. This may or may not lead to the purchase of additional reinsurance prior to a program's renewal date. In addition, prior to each renewal date, we consider how much, if any, coverage we intend to buy and we may make material changes to the current structure in light of various factors, including modeled PML assessment at various return periods, reinsurance pricing, our risk tolerance and exposures, and various other structuring considerations.

Chubb renewed its Global Property Catastrophe Reinsurance Program for our North American and International operations effective April 1, 2019 through March 31, 2020, with modest enhancements in coverage from the expiring program. The program consists of three layers in excess of losses retained by Chubb on a per occurrence basis. In addition, Chubb also renewed its terrorism coverage (excluding nuclear, biological, chemical and radiation coverage, with an inclusion of coverage for biological and chemical coverage for personal lines) for the United States from April 1, 2019 through March 31, 2020 with the same limits and retention and percentage placed except that the majority of terrorism coverage is on an aggregate basis above our retentions without a reinstatement.

Natural Catastrophe Property Reinsurance Program

Loss Location	Layer of Loss	Comments	Notes
United States (excluding Alaska and Hawaii)	$0 million – $1.0 billion	Losses retained by Chubb	(a)
United States (excluding Alaska and Hawaii)	$1.0 billion – $1.2 billion	All natural perils and terrorism	(b)
United States (excluding Alaska and Hawaii)	$1.2 billion – $2.2 billion	All natural perils and terrorism	(c)
United States (excluding Alaska and Hawaii)	$2.2 billion – $3.5 billion	All natural perils and terrorism	(d)
International (including Alaska and Hawaii)	$0 million – $175 million	Losses retained by Chubb	(a)
International (including Alaska and Hawaii)	$175 million – $1.175 billion	All natural perils and terrorism	(c)
Alaska, Hawaii, and Canada	$1.175 billion– $2.475 billion	All natural perils and terrorism	(d)

(a) Ultimate retention will depend upon the nature of the loss and the interplay between the underlying per risk programs and certain other catastrophe programs purchased by individual business units. These other catastrophe programs have the potential to reduce our effective retention below the stated levels.

(b) These coverages are partially placed with Reinsurers.

(c) These coverages are both part of the same Second layer within the Global Catastrophe Program and are fully placed with Reinsurers.

(d) These coverages are both part of the same Third layer within the Global Catastrophe Program and are fully placed with Reinsurers.

Chubb also has a property catastrophe bond in place that offers additional natural catastrophe protection for certain parts of the portfolio. The geographic scope of this coverage is from Virginia through Maine. The East Lane VI 2015 bond currently provides $250 million of coverage as part of a $427 million layer in excess of $2.0 billion retention through March 13, 2020.

Political Risk and Credit Insurance

Political risk insurance is a specialized coverage that provides clients with protection against unexpected, catastrophic political or macroeconomic events, primarily in emerging markets. We participate in this market through our wholly-owned subsidiary Sovereign Risk Insurance Ltd. (Sovereign), and through a unit of our London-based CGM operation. Chubb is one of the world's leading underwriters of political risk and credit insurance, has a global portfolio spread across more than 150 countries and is also a member of the Berne Union. Our clients include financial institutions, national export credit agencies, leading multilateral agencies, private equity firms and multinational corporations. CGM writes political risk and credit insurance business out of underwriting offices in London, United Kingdom; Hamburg, Germany; Sao Paulo, Brazil; Singapore; Tokyo, Japan; and in the U.S. in the following locations: Chicago, Illinois; New York, New York; Los Angeles, California; and Washington, D.C.

Our political risk insurance provides protection to commercial lenders against defaults on cross border loans, insulates investors against equity losses, and protects exporters against defaults on contracts. Commercial lenders, our largest client segment, are covered for missed scheduled loan repayments due to acts of confiscation, expropriation or nationalization by the host government, currency inconvertibility or exchange transfer restrictions, or war or other acts of political violence. In addition, in the case of loans to government-owned entities or loans that have a government guarantee, political risk policies cover scheduled payments against risks of non-payment or non-honoring of government guarantees. Private equity investors and corporations receive similar coverage to that of lenders, except their equity is protected against financial losses, inability to repatriate dividends, and physical damage to their operations caused by covered events. Our export contracts protection provides coverage for both exporters and their financing banks against the risk of contract frustration due to government actions, including non-payment by governmental entities.

CGM's credit insurance businesses cover losses due to insolvency, protracted default, and political risk perils including export and license cancellation. Our credit insurance product provides coverage to larger companies that have sophisticated credit risk management systems, with exposure to multiple customers and that have the ability to self-insure losses up to a certain level through excess of loss coverage. It also provides coverage to trade finance banks, exporters, and trading companies, with exposure to trade-related financing instruments. CGM also has limited capacity for Specialist Credit insurance products which provide coverage for project finance and working capital loans for large corporations and banks.

We have implemented structural features in our policies in order to control potential losses within the political risk and credit insurance businesses. These include basic loss sharing features that include co-insurance and deductibles, and in the case of trade credit, the use of non-qualifying losses that drop smaller exposures deemed too difficult to assess. Ultimate loss severity is also limited by using waiting periods to enable the insurer and insured to agree on recovery strategies, and the subrogation of the rights of the lender/exporter to the insurer following a claim. We have the option to pay claims over the original loan payment schedule, rather than in a lump sum in order to provide insureds and the insurer additional time to remedy problems and work towards full recoveries. It is important to note that political risk and credit policies are named peril conditional contracts, not financial guarantees, and claims are only paid after conditions and warranties are fulfilled. Political risk and credit insurance do not cover currency devaluations, bond defaults, movements in overseas equity markets, transactions deemed illegal, situations where corruption or misrepresentation has occurred, or debt that is not legally enforceable. In addition to assessing and mitigating potential exposure on a policy-by-policy basis, we also have specific risk management measures in place to manage overall exposure and risk. These measures include placing country, credit, and individual transaction limits based on country risk and credit ratings, combined single loss limits on multi-country policies, the use of reinsurance protection as well as quarterly modeling and stress-testing of the portfolio. We have a dedicated Country and Credit Risk management team that are responsible for the portfolio.

Crop Insurance

We are, and have been since the 1980s, one of the leading writers of crop insurance in the U.S. and have conducted that business through a managing general agent subsidiary of Rain and Hail. We provide protection throughout the U.S. on a variety of crops and are therefore geographically diversified, which reduces the risk of exposure to a single event or a heavy accumulation of losses in any one region. Our crop insurance business comprises two components - Multiple Peril Crop Insurance (MPCI) and crop-hail insurance.

The MPCI program, offered in conjunction with the U.S. Department of Agriculture’s Risk Management Agency (RMA), is a federal subsidized insurance program that covers revenue shortfalls or production losses due to natural causes such as drought, excessive moisture, hail, wind, freeze, insects, and disease. These Revenue Products are defined as providing both commodity price and yield coverages. Policies are available for various crops in different areas of the U.S. and generally have deductibles generally ranging from 10 percent to 50 percent of the insured's risk. The USDA's Risk Management Agency (RMA) sets the policy terms and conditions, rates and forms, and is also responsible for setting compliance standards. As a participant in the MPCI program, we report all details of policies to the RMA and are party to a Standard Reinsurance Agreement (SRA). The SRA sets out the relationship between private insurance companies and the Federal Crop Insurance Corporation (FCIC) concerning the terms and conditions regarding the risks each will bear including the pro-rata and state stop-loss provisions, which allows companies to limit the exposure of any one state or group of states on their underwriting results. In addition to the pro-rata and excess of loss reinsurance protections inherent in the SRA, we also purchase third-party proportional and stop-loss reinsurance for our MPCI business to reduce our exposure. We may also enter into crop derivative contracts to further manage our risk exposure.

Each year the RMA issues a final SRA for the subsequent reinsurance year (i.e., the 2020 SRA covers the 2020 reinsurance year from July 1, 2019 through June 30, 2020). There were no significant changes in the terms and conditions from the 2019 SRA and therefore, the new SRA does not impact Chubb's outlook on the crop program relative to 2020.

We recognize net premiums written as soon as estimable on our MPCI business, which is generally when we receive acreage reports from the policyholders on the various crops throughout the U.S. This allows us to best determine the premium associated with the liability that is being planted. The MPCI program has specific timeframes as to when producers must report acreage to us and in certain cases, the reporting occurs after the close of the respective reinsurance year. Once the net premium written has been recorded, the premium is then earned over the growing season for the crops. A majority of the crops that are covered in the program are typically subject to the SRA in effect at the beginning of the year. Given the major crops covered in the program, we typically see a substantial written and earned premium impact in the second and third quarters.

The pricing of MPCI premium is determined using a number of factors including commodity prices and related volatility (i.e., both impact the amount of premium we can charge to the policyholder). For example, in most states, the pricing for the MPCI Revenue Product for corn (i.e., insurance coverage for lower than expected crop revenue in a given season) includes a factor based on the average commodity price in February. If corn commodity prices are higher in February, compared to the February price in the prior year, and all other factors are the same, the increase in price will increase the corn premium year-over-year.

Pricing is also impacted by volatility factors, which measure the likelihood commodity prices will fluctuate over the crop year. For example, if volatility is set at a higher rate compared to the prior year, and all other factors are the same, the premium charged to the policyholder will be higher year-over-year for the same level of coverage.

Losses incurred on the MPCI business are determined using both commodity price and crop yield. With respect to commodity price, there are two important periods on a large portion of the business: The month of February when the initial premium base is set, and the month of October when the final harvest price is set. If the price declines from February to October, with yield remaining at normal levels, the policyholder may be eligible to recover on the policy. However, in most cases there are deductibles on these policies, therefore, the impact of a decline in price would have to exceed the deductible before a policyholder would be eligible to recover.

We evaluate our MPCI business at an aggregate level and the combination of all of our insured crops (both winter and summer) go into our underwriting gain or loss estimate in any given year. Typically, we do not have enough information on the harvest prices or crop yield outputs to quantify the preliminary estimated impact to our underwriting results until the fourth quarter.

Our crop-hail program is a private offering. Premium is earned on the crop-hail program over the coverage period of the policy. Given the very short nature of the growing season, most crop-hail business is typically written in the second and third quarters and the recognition of earned premium is also more heavily concentrated during this timeframe. We use industry data to develop our own rates and forms for the coverage offered. The policy primarily protects farmers against yield reduction caused by hail and/or fire, and related costs such as transit to storage. We offer various deductibles to allow the grower to partially self-insure for a reduced premium cost. We limit our crop-hail exposures through the use of township liability limits and third-party reinsurance on our net retained hail business.

Liquidity

Liquidity is a measure of a company's ability to generate cash flows sufficient to meet short-term and long-term cash requirements. As a holding company, Chubb Limited possesses assets that consist primarily of the stock of its subsidiaries and other investments. In addition to net investment income, Chubb Limited's cash flows depend primarily on dividends and other statutorily permissible payments. Historically, dividends and other statutorily permitted payments have come primarily from Chubb's Bermuda-based operating subsidiaries, which we refer to as our Bermuda subsidiaries. Our consolidated sources of funds consist primarily of net premiums written, fees, net investment income, and proceeds from sales and maturities of investments. Funds are used at our various companies primarily to pay claims, operating expenses, and dividends; to service debt; to purchase investments; and to fund acquisitions.

We anticipate that positive cash flows from operations (underwriting activities and investment income) should be sufficient to cover cash outflows under most loss scenarios for the near term. Should the need arise, we generally have access to capital markets and available credit facilities. Refer to “Credit Facilities” below for additional information. Our access to funds under the existing credit facility is dependent on the ability of the bank that is a party to the facility to meet its funding commitments. Should our existing credit provider experience financial difficulty, we may be required to replace credit sources, possibly in a difficult market. If we cannot obtain adequate capital or sources of credit on favorable terms, on a timely basis, or at all, our business, operating results, and financial condition could be adversely affected. To date, we have not experienced difficulty accessing our credit facility.

To further ensure the sufficiency of funds to settle unforeseen claims, we hold certain invested assets in cash and short-term investments. In addition, for certain insurance, reinsurance, or deposit contracts that tend to have relatively large and reasonably predictable cash outflows, we attempt to establish dedicated portfolios of assets that are duration-matched with the related liabilities. With respect to the duration of our overall investment portfolio, we manage asset durations to both maximize return given current market conditions and provide sufficient liquidity to cover future loss payments. At December 31, 2019, the average duration of our fixed maturities (3.8 years) is less than the average expected duration of our insurance liabilities (4.3 years).

Despite our safeguards, if paid losses accelerate beyond our ability to fund such paid losses from current operating cash flows, we might need to either liquidate a portion of our investment portfolio or arrange for financing. Potential events causing such a liquidity strain could include several significant catastrophes occurring in a relatively short period of time, large uncollectible reinsurance recoverables on paid losses (as a result of coverage disputes, reinsurers' credit problems, or decreases in the value of collateral supporting reinsurance recoverables) or increases in collateral postings under our variable annuity reinsurance business. Because each subsidiary focuses on a more limited number of specific product lines than is collectively available from the Chubb Group of Companies, the mix of business tends to be less diverse at the subsidiary level. As a result, the probability of a liquidity strain, as described above, may be greater for individual subsidiaries than when liquidity is assessed on a consolidated basis. If such a liquidity strain were to occur in a subsidiary, we could be required to liquidate a portion of our investments, potentially at distressed prices, as well as be required to contribute capital to the particular subsidiary and/or curtail dividends from the subsidiary to support holding company operations.

The payment of dividends or other statutorily permissible distributions from our operating companies are subject to the laws and regulations applicable to each jurisdiction, as well as the need to maintain capital levels adequate to support the insurance and reinsurance operations, including financial strength ratings issued by independent rating agencies. During 2019, we were able to meet all our obligations, including the payments of dividends on our Common Shares, with our net cash flows.

We assess which subsidiaries to draw dividends from based on a number of factors. Considerations such as regulatory and legal restrictions as well as the subsidiary's financial condition are paramount to the dividend decision. Chubb Limited received dividends of $200 million and $75 million from its Bermuda subsidiaries in 2019 and 2018, respectively.

The payment of any dividends from CGM or its subsidiaries is subject to applicable U.K. insurance laws and regulations. In addition, the release of funds by Syndicate 2488 to subsidiaries of CGM is subject to regulations promulgated by the Society of Lloyd's. Chubb Limited received no dividends from CGM in 2019 and 2018.

The U.S. insurance subsidiaries of Chubb INA may pay dividends, without prior regulatory approval, subject to restrictions set out in state law of the subsidiary's domicile (or, if applicable, commercial domicile). Chubb INA's international subsidiaries are also subject to insurance laws and regulations particular to the countries in which the subsidiaries operate. These laws and regulations sometimes include restrictions that limit the amount of dividends payable without prior approval of regulatory insurance authorities. Chubb Limited received no dividends from Chubb INA in 2019 and 2018. Debt issued by Chubb INA is serviced by statutorily permissible distributions by Chubb INA's insurance subsidiaries to Chubb INA as well as other group resources. Chubb INA received dividends of $3.7 billion and $5.2 billion from its subsidiaries in 2019 and 2018, respectively. At December 31, 2019, the amount of dividends available to be paid to Chubb INA in 2019 from its subsidiaries without prior approval of insurance regulatory authorities totals $3.1 billion.

In January 2020, Chubb INA Holdings Inc. paid $1.5 billion towards the series of intercompany loans involving its parents, Chubb Group Holdings Inc. and Chubb Limited. Additionally, Chubb Limited contributed $1.2 billion to a Bermuda subsidiary.

Cash Flows

Our insurance and reinsurance operations provide liquidity in that premiums are received in advance, sometimes substantially in advance, of the time claims are paid. Generally, cash flows are affected by claim payments that, due to the nature of our operations, may comprise large loss payments on a limited number of claims and which can fluctuate significantly from period to period. The irregular timing of these loss payments can create significant variations in cash flows from operations between periods. Refer to "Contractual Obligations and Commitments" for our estimate of future claim payments by period. Sources of liquidity include cash from operations, routine sales of investments, and financing arrangements. The following is a discussion of our cash flows for 2019, 2018, and 2017.

Operating cash flows reflect Net income for each period, adjusted for non-cash items and changes in working capital.

Operating cash flows were $6.3 billion in 2019, compared to $5.5 billion and $4.5 billion in 2018 and 2017, respectively. Operating cash flow was higher in 2019 compared to 2018, primarily due to higher underwriting cash flow, partially offset by higher taxes paid compared to 2018 principally due to the timing of tax payments. The increase in operating cash flows of $977 million in 2018 compared to 2017 was primarily due to higher premiums collected, net of higher catastrophe loss payments related to the 2017 catastrophe events, and lower taxes paid principally due to the timing of tax payments.

Cash used for investing was $5.9 billion in 2019, compared to $2.9 billion and $2.4 billion in 2018 and 2017, respectively. The increase in cash used for investing of $3.0 billion in 2019 was primarily due to net purchases of short-term investments of $1.1 billion in 2019 compared to net proceeds of $516 million in 2018. Additionally, the increase in 2019 was due to the purchase of an additional 10.9 percent ownership interest in Huatai Group for $580 million. Cash used for investing in 2018 was higher compared to 2017, due to higher net private equity contributions, net of distributions received, of $793 million.

Cash used for financing was $151 million in 2019, compared to $2.0 billion and $2.3 billion in 2018 and 2017, respectively. Cash used for financing was lower by $1.8 billion in 2019 compared to 2018 primarily due to higher net proceeds from the issuance of long-term debt (net of repayments) of $2.1 billion offset by higher share repurchases of $486 million. Cash used for financing in 2018 was lower by $328 million, primarily due to higher net repayments of long-term debt in 2017.

Both internal and external forces influence our financial condition, results of operations, and cash flows. Claim settlements, premium levels, and investment returns may be impacted by changing rates of inflation and other economic conditions. In many cases, significant periods of time, ranging up to several years or more, may lapse between the occurrence of an insured loss, the reporting of the loss to us, and the settlement of the liability for that loss.

We use repurchase agreements as a low-cost funding alternative. At December 31, 2019, there were $1.4 billion in repurchase agreements outstanding with various maturities over the next five months.

In addition to cash from operations, routine sales of investments, and financing arrangements, we have agreements with a third-party bank provider which implemented two international multi-currency notional cash pooling programs to enhance cash management efficiency during periods of short-term timing mismatches between expected inflows and outflows of cash by currency. The programs allow us to optimize investment income by avoiding portfolio disruption. In each program, participating Chubb entities establish deposit accounts in different currencies with the bank provider. Each day the credit or debit balances in every account are notionally translated into a single currency (U.S. dollars) and then notionally pooled. The bank extends overdraft credit to all participating Chubb entities as needed, provided that the overall notionally pooled balance of all accounts in each pool at the end of each day is at least zero. Actual cash balances are not physically converted and are not commingled between legal entities. Chubb entities may incur overdraft balances as a means to address short-term liquidity needs. Any overdraft balances incurred under this program by a Chubb entity would be guaranteed by Chubb Limited (up to $300 million in the aggregate). Our syndicated letter of credit facility allows for same day drawings to fund a net pool overdraft should participating Chubb entities withdraw contributed funds from the pool.

Capital Resources

Capital resources consist of funds deployed or available to be deployed to support our business operations.

(in millions of U.S. dollars, except for percentages)		**December 31 2019**		December 31 2018
Short-term debt	**$**	**1,299**	$	509
Long-term debt		**13,559**		12,087
Total financial debt		**14,858**		12,596
Trust preferred securities		**308**		308
Total shareholders' equity		**55,331**		50,312
Total capitalization	**$**	**70,497**	$	63,216
Ratio of financial debt to total capitalization		**21.1%**		19.9%
Ratio of financial debt plus trust preferred securities to total capitalization		**21.5%**		20.4%

Repurchase agreements are excluded from the table above and are disclosed separately from short-term debt in the Consolidated balance sheets. The repurchase agreements are collateralized borrowings where we maintain the right and ability to redeem the collateral on short notice, unlike short-term debt which comprises the current maturities of our long-term debt instruments.

Refer to Note 9 to the Consolidated Financial Statements for details about the debt issued and debt redeemed.

We believe our financial strength provides us with the flexibility and capacity to obtain available funds externally through debt or equity financing on both a short-term and long-term basis. Our ability to access the capital markets is dependent on, among other things, market conditions and our perceived financial strength. We have accessed both the debt and equity markets from time to time. We generally maintain the ability to issue certain classes of debt and equity securities via an unlimited Securities and Exchange Commission (SEC) shelf registration which is renewed every three years. This allows us capital market access for refinancing as well as for unforeseen or opportunistic capital needs. In October 2018, we filed an unlimited shelf registration which allows us to issue certain classes of debt and equity. This shelf registration expires in October 2021.

Securities Repurchases
From time to time, we repurchase shares as part of our capital management program. The Board of Directors (Board) has authorized share repurchase programs as follows:

- $1.0 billion of Chubb Common Shares from November 17, 2016 through December 31, 2017
- $1.0 billion of Chubb Common Shares from January 1, 2018 through December 31, 2018
- $1.5 billion of Chubb Common Shares from December 1, 2018 through December 31, 2019
- $1.5 billion of Chubb Common Shares from November 21, 2019 through December 31, 2020

Share repurchases may be made in the open market, in privately negotiated transactions, block trades, accelerated repurchases and/or through option or other forward transactions. In 2017, 2018 and 2019, we repurchased $830 million, $1.02 billion and $1.53 billion, respectively, of Common Shares in a series of open market transactions under the Board share repurchase authorizations. The $1.5 billion December 2018 Board authorization remained effective through December 31, 2019, and was used in advance of the $1.5 billion share repurchase authorized in November 2019. For the period January 1 through February 26, 2020, we repurchased 947,400 Common Shares for a total of $151 million in a series of open market transactions. At February 26, 2020, $1.30 billion in share repurchase authorization remained through December 31, 2020.

Common Shares
Our Common Shares had a par value of CHF 24.15 each at December 31, 2019.

As of December 31, 2019, there were 27,812,297 Common Shares in treasury with a weighted average cost of $134.98 per share.

Under Swiss law, dividends must be stated in Swiss francs though dividend payments are made by Chubb in U.S. dollars.

At our May 2018 annual general meeting, our shareholders approved an annual dividend for the following year of up to $2.92 per share, which was paid in four quarterly installments of $0.73 per share at dates determined by the Board after the annual general meeting by way of a distribution from capital contribution reserves, transferred to free reserves for payment.

At our May 2019 annual general meeting, our shareholders approved an annual dividend for the following year of up to $3.00 per share, expected to be paid in four quarterly installments of $0.75 per share after the annual general meeting by way of distribution from capital contribution reserves, transferred to free reserves for payment. The Board will determine the record and payment dates at which the annual dividend may be paid until the date of the 2020 annual general meeting, and is authorized to abstain from distributing a dividend at its discretion. The first three quarterly installments each of $0.75 per share, have been distributed by the Board as expected.

Dividend distributions on Common Shares amounted to CHF 2.94 ($2.98) per share for the year ended December 31, 2019. Refer to Note 11 to the Consolidated Financial Statements for additional information on our dividends.

Contractual Obligations and Commitments

The following table presents our future payments due by period under contractual obligations at December 31, 2019:

		Payments Due By Period			
(in millions of U.S. dollars)	Total	2020	2021 and 2022	2023 and 2024	Thereafter
Payment amounts determinable from the respective contracts					
Deposit liabilities (1)	$ 2,092	$ 21	$ 51	$ 131	$ 1,889
Purchase obligations (2)	411	159	223	29	—
Investments, including Limited Partnerships (3)	3,994	1,328	1,721	895	50
Huatai share acquisition deposits (4)	1,550	1,550	—	—	—
Operating leases	660	158	243	154	105
Repurchase agreements	1,416	1,416	—	—	—
Short-term debt	1,301	1,301	—	—	—
Long-term debt (5)	13,292	—	1,000	1,954	10,338
Trust preferred securities	309	—	—	—	309
Interest on debt obligations (5)	6,199	479	898	810	4,012
Total obligations in which payment amounts are determinable from the respective contracts	31,224	6,412	4,136	3,973	16,703
Payment amounts not determinable from the respective contracts					
Estimated gross loss payments under insurance and reinsurance contracts	62,713	17,601	17,200	8,731	19,181
Estimated payments for future policy benefits	20,645	916	1,885	1,541	16,303
Total contractual obligations and commitments	$ 114,582	$ 24,929	$ 23,221	$ 14,245	$ 52,187

(1) Refer to Note 1 k) to the Consolidated Financial Statements.

(2) Primarily comprises audit fees and agreements with vendors to purchase system software administration and maintenance services.

(3) Funding commitment primarily related to limited partnerships. The timing of the payments of these commitments is uncertain and may differ from the estimated timing in the table.

(4) Chubb entered into agreements to purchase incremental ownership interests in Huatai Insurance Group Company Limited through two separate purchases, a 15.3 percent ownership interest for approximately $1.1 billion and a 7.1 percent ownership interest for approximately $493 million. The purchases are contingent upon obtaining regulatory approvals and other important conditions, which are expected to be obtained by the end of 2021. The 7.1 percent purchase is also contingent upon receipt of Chinese insurance regulatory approval of the 15.3 percent purchase. In connection with these purchase agreements, in January 2020, we paid collateralized deposits totaling $1.550 billion to the selling shareholders, which are accounted for as loans.

(5) Subject to foreign exchange fluctuations on interest expense and principal.

The above table excludes the following items:

- Pension obligations: Minimum funding requirements for our pension obligations are immaterial. Subsequent funding commitments are apt to vary due to many factors and are difficult to estimate at this time. Refer to Note 13 to the Consolidated Financial Statements for additional information.
- Liabilities for unrecognized tax benefits: The liability for unrecognized tax benefits, excluding interest and offsetting tax credits, was $47 million at December 31, 2019. At December 31, 2019, we had accrued $8 million in liabilities for income tax-related interest and penalties in our Consolidated balance sheet. We are unable to make a reasonably reliable estimate for the timing of cash settlement with respect to these liabilities. Refer to Note 8 to the Consolidated Financial Statements for additional information.

We have no other significant contractual obligations or commitments not reflected in the table above. We do not have any off-balance sheet arrangements that are reasonably likely to have a material effect on our financial condition, revenues or expenses, results of operations, liquidity, capital expenditures, or capital resources.

Estimated gross loss payments under insurance and reinsurance contracts
We are obligated to pay claims under insurance and reinsurance contracts for specified loss events covered under those contracts. Such loss payments represent our most significant future payment obligation as a P&C insurance and reinsurance company. In contrast to other contractual obligations, cash payments are not determinable from the terms specified within the contract. For example, we do not ultimately make a payment to our counterparty for many insurance and reinsurance contracts (i.e., when a loss event has not occurred) and if a payment is to be made, the amount and timing cannot be determined from the contract. In the table above, we estimate payments by period relating to our gross liability for unpaid losses and loss expenses included in the Consolidated balance sheet at December 31, 2019, and do not take into account reinsurance recoverable. These estimated loss payments are inherently uncertain and the amount and timing of actual loss payments are likely to differ from these estimates and the differences could be material. Given the numerous factors and assumptions involved in both estimates of loss and loss expense reserves and related estimates as to the timing of future loss and loss expense payments in the table above, differences between actual and estimated loss payments will not necessarily indicate a commensurate change in ultimate loss estimates. The liability for Unpaid losses and loss expenses presented in our balance sheet is discounted for certain structured settlements, for which the timing and amount of future claim payments are reliably determinable, and certain reserves for unsettled claims. Our loss reserves are not discounted for the time value of money. Accordingly, the estimated amounts in the table exceed the liability for Unpaid losses and loss expenses presented in our balance sheet. Refer to Note 1 h) to the Consolidated Financial Statements for additional information.

Estimated payments for future policy benefits
We establish reserves for future policy benefits for life, long-term health, and annuity contracts. The amounts in the table are gross of fees or premiums due from the underlying contracts. The liability for Future policy benefits for life, long-term health, and annuity contracts presented in our balance sheet is discounted and reflected net of fees or premiums due from the underlying contracts. Accordingly, the estimated amounts in the table exceed the liability for Future policy benefits presented in our balance sheet. Payment amounts related to these reserves must be estimated and are not determinable from the contract. Due to the uncertainty with respect to the timing and amount of these payments, actual results could materially differ from the estimates in the table.

Credit Facilities

As our Bermuda subsidiaries are non-admitted insurers and reinsurers in the U.S., the terms of certain U.S. insurance and reinsurance contracts require them to provide collateral, which can be in the form of letters of credit (LOCs). LOCs may also be used for general corporate purposes.

On October 25, 2017, we entered into a credit facility that provides for up to $1.0 billion of availability, all of which may be used for the issuance of LOC and for revolving loans. We have the ability to increase the capacity to $2.0 billion under certain conditions, but any such increase would not raise the sub-limit for revolving loans above $1.0 billion. Our existing credit facility has a remaining term expiring in October 2022. At December 31, 2019, our LOC usage was $567 million.

Our access to funds under an existing credit facility is dependent on the ability of the banks that are a party to the facility to meet their funding commitments. In the event that such credit support is insufficient, we could be required to provide alternative security to clients. This could take the form of additional insurance trusts supported by our investment portfolio or funds withheld using our cash resources. The value of LOCs required is driven by, among other things, statutory liabilities reported by variable annuity guarantee reinsurance clients, loss development of existing reserves, the payment pattern of such reserves, the expansion of business, and loss experience of such business.

The facility noted above requires that we maintain certain covenants, all of which have been met at December 31, 2019. These covenants include:

(i) a minimum consolidated net worth of not less than $34.985 billion; and
(ii) a ratio of consolidated debt to total capitalization of not greater than 0.35 to 1.

At December 31, 2019, (a) the minimum consolidated net worth requirement under the covenant described in (i) above was $34.985 billion and our actual consolidated net worth as calculated under that covenant was $54.7 billion and (b) our ratio of debt to total capitalization, as calculated under the covenant which excludes the fair value adjustment of debt acquired through the Chubb Corp acquisition, was 0.21 to 1, which is below the maximum debt to total capitalization ratio of 0.35 to 1 as described in (ii) above.

Our failure to comply with the covenants under any credit facility would, subject to grace periods in the case of certain covenants, result in an event of default. This could require us to repay any outstanding borrowings or to cash collateralize LOCs under such facility. Our failure to repay material financial obligations, as well as our failure with respect to certain other events expressly identified, would result in an event of default under the facility.

Should our existing credit provider experience financial difficulty, we may be required to replace credit sources, possibly in a difficult market. If we cannot obtain adequate capital or sources of credit on favorable terms, on a timely basis, or at all, our business, operating results, and financial condition could be adversely affected. To date, we have not experienced difficulty accessing our credit facility.

Ratings

Chubb Limited and its subsidiaries are assigned credit and financial strength (insurance) ratings from internationally recognized rating agencies, including S&P, A.M. Best, Moody's, and Fitch. The ratings issued on our companies by these agencies are announced publicly and are available directly from the agencies. Our Internet site (investors.chubb.com, under Shareholder Resources/Rating Agency Ratings) also contains some information about our ratings, but such information on our website is not incorporated by reference into this report.

Financial strength ratings reflect the rating agencies' opinions of a company's claims paying ability. Independent ratings are one of the important factors that establish our competitive position in the insurance markets. The rating agencies consider many factors in determining the financial strength rating of an insurance company, including the relative level of statutory surplus necessary to support the business operations of the company. These ratings are based upon factors relevant to policyholders, agents, and intermediaries and are not directed toward the protection of investors. Such ratings are not recommendations to buy, sell, or hold securities.

Credit ratings assess a company's ability to make timely payments of principal and interest on its debt. It is possible that, in the future, one or more of the rating agencies may reduce our existing ratings. If one or more of our ratings were downgraded, we could incur higher borrowing costs, and our ability to access the capital markets could be impacted. In addition, our insurance and reinsurance operations could be adversely impacted by a downgrade in our financial strength ratings, including a possible reduction in demand for our products in certain markets. Also, we have insurance and reinsurance contracts which contain rating triggers. In the event the S&P or A.M. Best financial strength ratings of Chubb fall, we may be faced with the cancellation of premium or be required to post collateral on our underlying obligation associated with this premium. We estimate that at December 31, 2019, a one-notch downgrade of our S&P or A.M. Best financial strength ratings would result in an immaterial loss of premium or requirement for collateral to be posted.

ITEM 7A. Quantitative and Qualitative Disclosures about Market Risk

Market Sensitive Instruments and Risk Management

Market risk represents the potential for loss due to adverse changes in the fair value of financial instruments. We are exposed to potential losses from various market risks including changes in interest rates, equity prices, and foreign currency exchange rates. Further, through writing the GLB and GMDB products, we are exposed to volatility in the equity and credit markets, as well as interest rates. Our investment portfolio consists primarily of fixed income securities, denominated in both U.S. dollars and foreign currencies, which are sensitive to changes in interest rates and foreign currency exchange rates. The majority of our fixed income portfolio is classified as available for sale. The effect of market movements on our available for sale investment portfolio impacts Net income (through Net realized gains (losses)) when securities are sold or when we record an OTTI charge in Net income. Changes in interest rates and foreign currency exchange rates will have an immediate effect on Shareholders' equity and Comprehensive income and in certain instances, Net income. From time to time, we also use derivative instruments such as futures, options, swaps, and foreign currency forward contracts to manage the duration of our investment portfolio and foreign currency exposures and also to obtain exposure to a particular financial market. At December 31, 2019 and 2018, our notional exposure to derivative instruments was $4.9 billion and $9.1 billion, respectively. These instruments are recognized as assets or liabilities in our consolidated financial statements and are sensitive to changes in interest rates, foreign currency exchange rates, and equity security prices. As part of our investing activities, we purchase to be announced mortgage backed securities (TBAs). Changes in the fair value of TBAs are included in Net realized gains (losses) and therefore, have an immediate effect on both our Net income and Shareholders' equity.

We seek to mitigate market risk using a number of techniques, including maintaining and managing the assets and liabilities of our international operations consistent with the foreign currencies of the underlying insurance and reinsurance businesses, thereby limiting exchange rate risk to net assets denominated in foreign currencies.

The following is a discussion of our primary market risk exposures at December 31, 2019. Our policies to address these risks in 2019 were not materially different from 2018. We do not currently anticipate significant changes in our primary market risk exposures or in how those exposures are managed in future reporting periods based upon what is known or expected to be in effect in future reporting periods.

Interest rate risk – fixed income portfolio and debt obligations
Our fixed income portfolio and debt obligations have exposure to interest rate risk. Changes in investment values attributable to interest rate changes are mitigated by corresponding and partially offsetting changes in the economic value of our insurance reserves and debt obligations. We monitor this exposure through periodic reviews of our asset and liability positions.

The following table presents the impact at December 31, 2019 and 2018, on the fair value of our fixed income portfolio of a hypothetical increase in interest rates of 100 bps applied instantly across the U.S. yield curve (an immediate time horizon was used as this presents the worst case scenario):

(in billions of U.S. dollars, except for percentages)		**2019**		2018
Fair value of fixed income portfolio	**$**	**102.8**	$	94.7
Pre-tax impact of 100 bps increase in interest rates:				
Decrease in dollars	**$**	**3.9**	$	3.5
As a percentage of total fixed income portfolio at fair value		**3.8%**		3.7%

Changes in interest rates will have an immediate effect on Comprehensive income and Shareholders' equity but will not ordinarily have an immediate effect on Net income. Variations in market interest rates could produce significant changes in the timing of prepayments due to available prepayment options. For these reasons, actual results could differ from those reflected in the tables.

Although our debt and trust preferred securities (collectively referred to as debt obligations) are reported at amortized cost and not adjusted for fair value changes, changes in interest rates could have a material impact on their fair value, albeit there would be no impact on our consolidated financial statements.

The following table presents the impact at December 31, 2019 and 2018, on the fair value of our debt obligations of a hypothetical decrease in interest rates of 100 bps applied instantly across the U.S. yield curve (an immediate time horizon was used as this presents the worst case scenario):

(in millions of U.S. dollars, except for percentages)		**2019**		2018
Fair value of debt obligations, including repurchase agreements	**$**	**18,238**	$	14,524
Pre-tax impact of 100 bps decrease in interest rates:				
Increase in dollars	**$**	**1,570**	$	1,201
As a percentage of total debt obligations at fair value		**8.6%**		8.3%

Foreign currency management
As a global company, Chubb entities transact business in multiple currencies. Our policy is to generally match assets, liabilities and required capital for each individual jurisdiction in local currency, which would include the use of derivatives. We do not hedge our net asset non-U.S. dollar capital positions; however, we do consider hedging for planned cross border transactions.

The following table summarizes the net assets in non-U.S. currencies at December 31, 2019 and 2018:

	2019		2018		
(in millions of U.S. dollars, except for percentages)	**Value of Net Assets**	**Exchange rate per USD**	Value of Net Assets	Exchange rate per USD	2019 vs. 2018 % change in exchange rate per USD
Canadian dollar (CAD)	**$ 2,220**	**0.7698**	$ 2,114	0.7333	5.0 %
British pound sterling (GBP)	**2,024**	**1.3257**	1,901	1.2754	3.9 %
Euro (EUR)	**1,675**	**1.1213**	1,896	1.1467	(2.2)%
Australian dollar (AUD)	**1,100**	**0.7021**	1,149	0.7049	(0.4)%
Brazilian real (BRL)	**990**	**0.2485**	938	0.2577	(3.6)%
Mexican peso (MXN)	**942**	**0.0528**	729	0.0509	3.7 %
Korean won (KRW) (x100)	**788**	**0.0865**	726	0.0900	(3.9)%
Hong Kong dollar (HKD)	**653**	**0.1284**	362	0.1277	0.5 %
Thai baht (THB)	**606**	**0.0337**	459	0.0309	9.1 %
Chilean peso (CLP) (x100)	**489**	**0.1328**	28	0.1441	(7.8)%
Euro denominated debt [1]	**(4,804)**	**1.1213**	(2,016)	1.1467	(2.2)%
Other foreign currencies	**2,474**	**various**	2,106	various	NM
Value of net assets denominated in foreign currencies [2]	**$ 9,157**		$ 10,392		
As a percentage of total net assets	**16.6%**		20.7%		
Pre-tax decrease to Shareholders' equity of a hypothetical 10 percent strengthening of the U.S. dollar	**$ 832**		$ 945		

NM – not meaningful

(1) Refer to Note 9 to the Consolidated Financial Statements for additional information.

(2) At December 31, 2019, net assets denominated in foreign currencies comprised approximately 6 percent tangible assets and 94 percent intangible assets, primarily goodwill.

Effective July 1, 2018, Argentina was designated as a highly inflationary economy and therefore we changed the functional currency for our Argentine operations from the Argentine Peso to the U.S. dollar. Our net assets denominated in the Argentine Peso represented less than 0.1 percent of consolidated shareholders' equity. Therefore, this change in the functional currency of our Argentine operations did not have a material impact on our financial condition or results of operations.

Reinsurance of GMDB and GLB guarantees
Chubb views its variable annuity reinsurance business as having a similar risk profile to that of catastrophe reinsurance with the probability of long-term economic loss relatively small, at the time of pricing. Adverse changes in market factors and policyholder behavior will have an impact on both Life Insurance underwriting income and net income. When evaluating these risks, we expect to be compensated for taking both the risk of a cumulative long-term economic net loss, as well as the short-term accounting variations caused by these market movements. Therefore, we evaluate this business in terms of its long-term economic risk and reward.

Net income is directly impacted by changes in benefit reserves calculated in connection with reinsurance of variable annuity guarantees. In addition, net income is directly impacted by changes in the fair value of the GLB liability (FVL), which is classified as a derivative for accounting purposes. The FVL established for a GLB reinsurance contract represents the difference between the fair value of the contract and the benefit reserves. Benefit reserves and FVL calculations are directly affected by market factors, including equity levels, interest rate levels, credit risk, and implied volatilities, as well as policyholder behaviors, such as annuitization and lapse rates, and policyholder mortality.

The tables below are estimates of the sensitivities to instantaneous changes in economic inputs (e.g., equity shock, interest rate shock, etc.) or actuarial assumptions at December 31, 2019 of the FVL and of the fair value of specific derivative instruments held (hedge value) to partially offset the risk in the variable annuity guarantee reinsurance portfolio. The following assumptions should be considered when using the below tables:

- No changes to the benefit ratio used to establish benefit reserves at December 31, 2019.
- Equity shocks impact all global equity markets equally
  - Our liabilities are sensitive to global equity markets in the following proportions: 75 percent—85 percent U.S. equity, and 15 percent—25 percent international equity.
  - Our current hedge portfolio is sensitive only to U.S. equity markets.
  - We would suggest using the S&P 500 index as a proxy for U.S. equity, and the MSCI EAFE index as a proxy for international equity.
- Interest rate shocks assume a parallel shift in the U.S. yield curve
  - Our liabilities are also sensitive to global interest rates at various points on the yield curve, mainly the U.S. Treasury curve in the following proportions: 5 percent—15 percent short-term rates (maturing in less than 5 years), 25 percent—35 percent medium-term rates (maturing between 5 years and 10 years, inclusive), and 55 percent—65 percent long-term rates (maturing beyond 10 years).
  - A change in AA-rated credit spreads impacts the rate used to discount cash flows in the fair value model. AA-rated credit spreads are a proxy for both our own credit spreads and the credit spreads of the ceding insurers.
- The hedge sensitivity is from December 31, 2019 market levels and only applicable to the equity and interest rate sensitivities table below.
- The sensitivities are not directly additive because changes in one factor will affect the sensitivity to changes in other factors. The sensitivities do not scale linearly and may be proportionally greater for larger movements in the market factors. The sensitivities may also vary due to foreign exchange rate fluctuations. The calculation of the FVL is based on internal models that include assumptions regarding future policyholder behavior, including lapse, annuitization, and asset allocation. These assumptions impact both the absolute level of the FVL as well as the sensitivities to changes in market factors shown below. Actual sensitivity of our net income may differ from those disclosed in the tables below due to differences between short-term market movements and management judgment regarding the long-term assumptions implicit in our benefit ratios.
- In addition, the tables below do not reflect the expected quarterly run rate of net income generated by the variable annuity guarantee reinsurance portfolio if markets remain unchanged during the period. All else equal, if markets remain unchanged during the period, the Gross FVL will increase, resulting in a realized loss. This realized loss occurs primarily because the guarantees provided in the underlying contracts continue to become more valuable even when markets remain unchanged. We refer to this increase in Gross FVL as “timing effect”. The unfavorable impact of timing effect on our Gross FVL in a quarter is not reflected in the sensitivity tables below. For this reason, when using the tables below to estimate the sensitivity of Gross FVL in the first quarter 2020 to various changes, it is necessary to assume an additional $5 million to $45 million increase in Gross FVL and realized losses. The impact to Net income is partially mitigated because this realized loss is partially offset by the positive quarterly run rate of Life Insurance underwriting income generated by the variable annuity guarantee reinsurance portfolio if markets remain unchanged during the period. Note that both the timing effect and the quarterly run rate of Life Insurance underwriting income change over time as the book ages.

Sensitivities to equity and interest rate movements

(in millions of U.S. dollars)		Worldwide Equity Shock					
Interest Rate Shock		+10%	Flat	-10 %	-20 %	-30 %	-40 %
+100 bps	(Increase)/decrease in Gross FVL	$ 343	$ 207	$ 49	$ (138)	$ (357)	$ (604)
	Increase/(decrease) in hedge value	(63)	—	63	125	188	250
	Increase/(decrease) in net income	$ 280	$ 207	$ 112	$ (13)	$ (169)	$ (354)
Flat	(Increase)/decrease in Gross FVL	$ 156	$ —	$ (182)	$ (394)	$ (636)	$ (904)
	Increase/(decrease) in hedge value	(63)	—	63	125	188	250
	Increase/(decrease) in net income	$ 93	$ —	$ (119)	$ (269)	$ (448)	$ (654)
-100 bps	(Increase)/decrease in Gross FVL	$ (74)	$ (249)	$ (451)	$ (681)	$ (936)	$ (1,215)
	Increase/(decrease) in hedge value	(63)	—	63	125	188	250
	Increase/(decrease) in net income	$ (137)	$ (249)	$ (388)	$ (556)	$ (748)	$ (965)

Sensitivities to Other Economic Variables	AA-rated Credit Spreads		Interest Rate Volatility		Equity Volatility	
(in millions of U.S. dollars)	+100 bps	-100 bps	+2 %	-2 %	+2 %	-2 %
(Increase)/decrease in Gross FVL	$ 73	$ (81)	$ —	$ 1	$ (9)	$ 9
Increase/(decrease) in net income	$ 73	$ (81)	$ —	$ 1	$ (9)	$ 9

Sensitivities to Actuarial Assumptions	Mortality			
(in millions of U.S. dollars)	+20 %	+10 %	-10 %	-20 %
(Increase)/decrease in Gross FVL	$ 18	$ 9	$ (9)	$ (19)
Increase/(decrease) in net income	$ 18	$ 9	$ (9)	$ (19)

	Lapses			
(in millions of U.S. dollars)	+50 %	+25 %	-25 %	-50 %
(Increase)/decrease in Gross FVL	$ 101	$ 52	$ (57)	$ (120)
Increase/(decrease) in net income	$ 101	$ 52	$ (57)	$ (120)

	Annuitization			
(in millions of U.S. dollars)	+50 %	+25 %	-25 %	-50 %
(Increase)/decrease in Gross FVL	$ (498)	$ (264)	$ 298	$ 585
Increase/(decrease) in net income	$ (498)	$ (264)	$ 298	$ 585

Variable Annuity Net Amount at Risk

All our VA reinsurance treaties include annual or aggregate claim limits and many include an aggregate deductible which limit the net amount at risk under these programs. The tables below present the net amount at risk at December 31, 2019 following an immediate change in equity market levels, assuming all global equity markets are impacted equally. For further information on the net amount at risk, refer to Note 5 c) to the Consolidated Financial Statements.

a) Reinsurance covering the GMDB risk only

	Equity Shock					
(in millions of U.S. dollars)	+20%	Flat	-20 %	-40 %	-60 %	-80 %
GMDB net amount at risk	$ 271	$ 256	$ 442	$ 797	$ 817	$ 696
Claims at 100% immediate mortality	160	167	166	156	138	122

The treaty claim limits function as a ceiling as equity markets fall. As the shocks in the table above become incrementally more negative, the impact on the NAR and claims at 100 percent mortality begin to drop due to the specific nature of these claim limits, many of which are annual claim limits calculated as a percentage of the reinsured account value. There is also some impact due to a small portion of the GMDB reinsurance under which claims are positively correlated to equity markets (claims decrease as equity markets fall).

b) Reinsurance covering the GLB risk only

	Equity Shock					
(in millions of U.S. dollars)	+20%	Flat	-20 %	-40 %	-60 %	-80 %
GLB net amount at risk	$ 724	$ 1,095	$ 1,738	$ 2,516	$ 3,021	$ 3,387

The treaty claim limits cause the net amount at risk to increase at a declining rate as equity markets fall.

c) Reinsurance covering both the GMDB and GLB risks on the same underlying policyholders

	Equity Shock					
(in millions of U.S. dollars)	+20%	Flat	-20 %	-40 %	-60 %	-80 %
GMDB net amount at risk	$ 76	$ 91	$ 105	$ 117	$ 123	$ 123
GLB net amount at risk	305	415	560	723	888	985
Claims at 100% immediate mortality	16	16	17	17	17	17

The treaty limits control the increase in the GMDB net amount at risk as equity markets fall. The GMDB net amount at risk continues to grow as equity markets fall because most of these reinsurance treaties do not have annual claim limits calculated as a percentage of the underlying account value. The treaty limits cause the GLB net amount at risk to increase at a declining rate as equity markets fall.

ITEM 8. Financial Statements and Supplementary Data
The financial statements and supplementary data are included in this Form 10-K commencing on page F-1.

ITEM 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure
None.

ITEM 9A. Controls and Procedures
Chubb’s management, with the participation of Chubb’s Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of Chubb’s disclosure controls and procedures as defined in Rule 13a-15(e) and Rule 15d-15(e) under the Securities Exchange Act of 1934 as of December 31, 2019. Based upon that evaluation, Chubb’s Chief Executive Officer and Chief Financial Officer concluded that Chubb’s disclosure controls and procedures are effective in allowing information required to be disclosed in reports filed under the Securities Exchange Act of 1934 to be recorded, processed, summarized, and reported within time periods specified in the rules and forms of the SEC, and that such information is accumulated and communicated to Chubb’s management, including its Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

In 2016, Chubb completed the acquisition of The Chubb Corporation. For the year ended December 31, 2019, we continued to integrate the information technology environments of the two companies.

There were no other changes to Chubb's internal controls over financial reporting for the year ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, Chubb's internal controls over financial reporting. Chubb's management report on internal control over financial reporting is included on page F-3 and PricewaterhouseCoopers LLP's audit report is included on pages F-4, F-5, and F-6.

ITEM 9B. Other Information

Item not applicable.

PART III

ITEM 10. Directors, Executive Officers and Corporate Governance

Information pertaining to this item is incorporated by reference to the sections entitled "Agenda Item 5 - Election of the Board of Directors", "Corporate Governance - The Board of Directors - Director Nomination Process", and "Corporate Governance - The Committees of the Board - Audit Committee" of the definitive proxy statement for the 2020 Annual General Meeting of Shareholders which will be filed with the SEC not later than 120 days after the close of the fiscal year pursuant to Regulation 14A. Also incorporated herein by reference is the text under the caption "Information about our Executive Officers" appearing at the end of Part I Item 1 of the Annual Report on Form 10-K.

Code of Ethics
Chubb has adopted a Code of Conduct, which sets forth standards by which all Chubb employees, officers, and directors must abide as they work for Chubb. Chubb has posted this Code of Conduct on its Internet site (investors.chubb.com, under Corporate Governance/Highlights and Governance Documents/The Chubb Code of Conduct). Chubb intends to disclose on its Internet site any amendments to, or waivers from, its Code of Conduct that are required to be publicly disclosed pursuant to the rules of the SEC or the New York Stock Exchange.

ITEM 11. Executive Compensation

This item is incorporated by reference to the sections entitled "Executive Compensation", "Compensation Committee Report" and "Director Compensation" of the definitive proxy statement for the 2020 Annual General Meeting of Shareholders which will be filed with the SEC not later than 120 days after the close of the fiscal year pursuant to Regulation 14A.

ITEM 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Plan category	Number of securities to be issued upon exercise of outstanding options, warrants, and rights	Weighted-average exercise price of outstanding options, warrants, and rights (3)	Number of securities remaining available for future issuance under equity compensation plans
Equity compensation plans approved by security holders (1)	11,801,420	$ 116.79	12,575,263
Equity compensation plans not approved by security holders (2)	27,914		

(1) These totals include securities available for future issuance under the following plans:

(i) Chubb Limited 2016 Long-Term Incentive Plan (LTIP). A total of 19,500,000 shares are authorized to be issued pursuant to awards made as options, stock appreciation rights, stock units, performance shares, performance units, restricted stock, and restricted stock units. The maximum number of shares that may be delivered to participants and their beneficiaries under the LTIP shall be equal to the sum of: (x) 19,500,000 shares of stock; and (y) any shares of stock that have not been delivered pursuant to the ACE LTIP (as defined in clause (ii) of this footnote (1) below) and remain available for grant pursuant to the ACE LTIP, including shares of stock represented by awards granted under the ACE LTIP that are forfeited, expire or are canceled after the effective date of the LTIP without delivery of shares of stock or which result in the forfeiture of the shares of stock back to the Company to the extent that such shares would have been added back to the reserve under the terms of the ACE LTIP. As of December 31, 2019, a total of 5,288,553 option awards and 706,535 restricted stock unit awards are outstanding, and 10,789,285 shares remain available for future issuance under this plan.

(ii) ACE Limited 2004 Long-Term Incentive Plan (ACE LTIP). As of December 31, 2019, a total of 5,496,523 option awards and 72,075 restricted stock unit awards are outstanding. No additional grants will be made pursuant to the ACE LTIP.

(iii) The Chubb Corporation Long-Term Incentive Plan (2014) (Chubb Corp. LTIP). As of December 31, 2019, a total of 99,759 option awards, 3,433 restricted stock unit awards, nil performance unit awards (representing 100% of the aggregate target in accordance with the Chubb Corp. merger agreement) and 83,173 deferred stock unit awards are outstanding. No additional grants will be made pursuant to the Chubb Corp. LTIP.

(iv) ESPP. A total of 6,500,000 shares have been authorized for purchase at a discount. As of December 31, 2019, 1,785,978 shares remain available for future issuance under this plan.

(2) These plans are the Chubb Corp. CCAP Excess Benefit Plan (CCAP Excess Benefit Plan) and the Chubb Corp. Deferred Compensation Plan for Directors, under which no Common Shares are available for future issuance other than with respect to outstanding rewards. The CCAP Excess Benefit Plan is a nonqualified, defined contribution plan and covers those participants in the Capital Accumulation Plan of The Chubb Corporation (CCAP) (Chubb Corp.'s legacy 401(k) plan) and Chubb Corp.'s legacy employee stock ownership plan (ESOP) whose total benefits under those plans are limited by certain provisions of the Internal Revenue Code. A participant in the CCAP Excess Benefit Plan is entitled to a benefit equaling the difference between the participant's benefits under the CCAP and the ESOP, without considering the applicable limitations of the Code, and the participant's actual benefits under such plans. A participant's excess ESOP benefit is expressed as Common Shares. Payments under the CCAP Excess Benefit Plan are generally made: (i) for excess benefits related to the CCAP, in cash annually as soon as practical after the amount of excess benefit can be determined; and (ii) for excess benefits related to the ESOP, in Common Shares as soon as practicable after the participant's termination of employment. Allocations under the ESOP ceased in 2004. Accordingly, other than dividends, no new contributions are made to the ESOP or the CCAP Excess Benefit Plan with respect to excess ESOP benefits.

(3) Weighted average exercise price excludes shares issuable under performance unit awards and restricted stock unit awards.

ITEM 13. Certain Relationships and Related Transactions and Director Independence

This item is incorporated by reference to the sections entitled "Corporate Governance - What Is Our Related Party Transactions Approval Policy And What Procedures Do We Use To Implement It?", "Corporate Governance - What Related Party Transactions Do We Have?", and "Corporate Governance - The Board of Directors - Director Independence" of the definitive proxy statement for the 2020 Annual General Meeting of Shareholders which will be filed with the SEC not later than 120 days after the close of the fiscal year pursuant to Regulation 14A.

ITEM 14. Principal Accounting Fees and Services

This item is incorporated by reference to the section entitled "Agenda Item 4 – Election of Auditors – 4.2 – Ratification of appointment of PricewaterhouseCoopers LLP (United States) as independent registered public accounting firm for purposes of U.S. securities law reporting" of the definitive proxy statement for the 2020 Annual General Meeting of Shareholders which will be filed with the SEC not later than 120 days after the close of the fiscal year pursuant to Regulation 14A.

PART IV

ITEM 15. Exhibits, Financial Statement Schedules

(a)Financial Statements, Schedules, and Exhibits

Other schedules have been omitted as they are not applicable to Chubb, or the required information has been included in the Consolidated Financial Statements and related notes.

3. Exhibits

		Incorporated by Reference			
Exhibit Number	Exhibit Description	Form	Original Number	Date Filed	Filed Herewith
3.1	Articles of Association of the Company, as amended and restated	8-K	3.1	May 18, 2018	
3.2	Organizational Regulations of the Company as amended	8-K	3.1	November 21, 2016	
4.1	Articles of Association of the Company, as amended and restated	8-K	4.1	May 18, 2018	
4.2	Organizational Regulations of the Company as amended	8-K	3.1	November 21, 2016	
4.3	Specimen share certificate representing Common Shares	8-K	4.3	July 18, 2008	
4.4	Indenture, dated March 15, 2002, between ACE Limited and Bank One Trust Company, N.A.	8-K	4.1	March 22, 2002	
4.5	Senior Indenture, dated August 1, 1999, among ACE INA Holdings, Inc., ACE Limited and Bank of New York Mellon Trust Company, N.A. (as successor), as trustee	S-3 ASR	4.4	December 10, 2014	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
4.6	Indenture, dated November 30, 1999, among ACE INA Holdings, Inc. and Bank One Trust Company, N.A., as trustee	10-K	10.38	March 29, 2000	
4.7	Indenture, dated December 1, 1999, among ACE INA Holdings, Inc., ACE Limited and Bank One Trust Company, National Association, as trustee	10-K	10.41	March 29, 2000	
4.8	Amended and Restated Trust Agreement, dated March 31, 2000, among ACE INA Holdings, Inc., Bank One Trust Company, National Association, as property trustee, Bank One Delaware Inc., as Delaware trustee and the administrative trustees named therein	10-K	4.17	March 16, 2006	
4.9	Common Securities Guarantee Agreement, dated March 31, 2000	10-K	4.18	March 16, 2006	
4.10	Capital Securities Guarantee Agreement, dated March 31, 2000	10-K	4.19	March 16, 2006	
4.11	Form of 2.70 percent Senior Notes due 2023	8-K	4.1	March 13, 2013	
4.12	Form of 4.15 percent Senior Notes due 2043	8-K	4.2	March 13, 2013	
4.13	First Supplemental Indenture dated as of March 13, 2013 to the Indenture dated as of August 1, 1999 among ACE INA Holdings, Inc., as Issuer, ACE Limited, as Guarantor, and The Bank of New York Mellon Trust Company, N.A., as Successor Trustee	8-K	4.3	March 13, 2013	
4.14	Form of 3.35 percent Senior Notes due 2024	8-K	4.1	May 27, 2014	
4.15	Form of 3.150 percent Senior Notes due 2025	8-K	4.1	March 16, 2015	
4.16	Form of 2.30 percent Senior Notes due 2020	8-K	4.1	November 3, 2015	
4.17	Form of 2.875 percent Senior Notes due 2022	8-K	4.2	November 3, 2015	
4.18	Form of 3.35 percent Senior Notes due 2026	8-K	4.3	November 3, 2015	
4.19	Form of 4.35 percent Senior Notes due 2045	8-K	4.4	November 3, 2015	
4.20	First Supplemental Indenture to the Chubb Corp Senior Indenture dated as of January 15, 2016 to the Indenture dated as of October 25, 1989 among ACE INA Holdings, Inc., as Successor Issuer, ACE Limited, as Guarantor, and The Bank of New York Mellon Trust Company, N.A., as Trustee	8-K	4.1	January 15, 2016	
4.21	Second Supplemental Indenture to the Chubb Corp Junior Subordinated Indenture dated as of January 15, 2016 to the Indenture dated as of March 29, 2007 among ACE INA Holdings, Inc., as Successor Issuer, ACE Limited, as Guarantor, and The Bank of New York Mellon Trust Company, N.A., as Trustee	8-K	4.2	January 15, 2016	
4.22	Chubb Corp Senior Indenture (incorporated by reference to Exhibit 4(a) to Chubb Corp's Registration Statement on Form S-3 filed on October 27, 1989) (File No. 33-31796)	S-3	4(a)	October 27, 1989	
4.23	Chubb Corp Junior Subordinated Indenture (incorporated by reference to Exhibit 4.1 to Chubb Corp's Current Report on Form 8-K filed on March 30, 2007) (File No. 001-08661)	8-K	4.1	March 30, 2007	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
4.24	First Supplemental Indenture to the Chubb Corp Junior Subordinated Indenture dated as of March 29, 2007 between the Chubb Corporation and The Bank of New York Trust Company, N.A., as Trustee (incorporated by reference to Exhibit 4.2 to Chubb Corp's Current Report on Form 8-K filed on March 30, 2007) (File No. 001-08661)	8-K	4.2	March 30, 2007	
4.25	Form of 5.75 percent Chubb Corp Senior Notes due 2018 (incorporated by reference to Exhibit 4.1 to Chubb Corp's Current Report on Form 8-K filed on May 6, 2008) (File No. 001-08661)	8-K	4.1	May 6, 2008	
4.26	Form of 6.60 percent Chubb Corp Debentures due 2018 (incorporated by reference to Exhibit 4(a) to Chubb Corp's Registration Statement on Form S-3 filed on October 27, 1989) (File No. 33-31796)	S-3	4(a)	October 27, 1989	
4.27	Form of 6.80 percent Chubb Corp Debentures due 2031 (incorporated by reference to Exhibit 4(a) to Chubb Corp's Registration Statement on Form S-3 filed on October 27, 1989) (File No. 33-31796)	S-3	4(a)	October 27, 1989	
4.28	Form of 6.00 percent Chubb Corp Senior Notes due 2037 (incorporated by reference to Exhibit 4.1 to Chubb Corp's Current Report on Form 8-K filed on May 11, 2007) (File No. 001-08661)	8-K	4.1	May 11, 2007	
4.29	Form of 6.50 percent Chubb Corp Senior Notes due 2038 (incorporated by reference to Exhibit 4.2 to Chubb Corp's Current Report on Form 8-K filed on May 6, 2008) (File No. 001-08661)	8-K	4.2	May 6, 2008	
4.30	Form of debenture for the 6.375 percent Chubb Corp DISCs (incorporated by reference to Exhibit 4.3 to Chubb Corp's Current Report on Form 8-K filed on March 30, 2007) (File No. 001-08661)	8-K	4.3	March 30, 2007	
4.31	Procedures regarding the registration of shareholders in the share register of Chubb Limited	10-K	4.32	February 28, 2017	
4.32	Form of Officer's Certificate related to the 1.550% Senior Notes due 2028 and 2.500% Senior Notes due 2038	8-K	4.1	March 6, 2018	
4.33	Form of Global Note for the 1.550% Senior Notes due 2028	8-K	4.2	March 6, 2018	
4.34	Form of Global Note for the 2.500% Senior Notes due 2038	8-K	4.3	March 6, 2018	
4.35	Form of Officer's Certificate related to the 0.875% Senior Notes due 2027 and 1.400% Senior Notes due 2031	8-K	4.1	June 17, 2019	
4.36	Form of Global Note for the 0.875% Senior Notes due 2027	8-K	4.2	June 17, 2019	
4.37	Form of Global Note for the 1.400% Senior Notes due 2031	8-K	4.3	June 17, 2019	
4.38	Form of Officer’s Certificate related to the 0.300% Senior Notes due 2024 and 0.875% Senior Notes due 2029	8-K	4.1	December 5, 2019	
4.39	Form of Global Note for the 0.300% Senior Notes due 2024	8-K	4.2	December 5, 2019	
4.40	Form of Global Note for the 0.875% Senior Notes due 2029	8-K	4.3	December 5, 2019	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
4.41	Description of the Registrant's Securities				X
10.1*	Form of Indemnification Agreement between the Company and the directors of the Company, dated August 13, 2015	10-K	10.1	February 26, 2016	
10.2	Credit Agreement for $1,000,000,000 Senior Unsecured Letter of Credit Facility, dated as of November 6, 2012, among ACE Limited, and certain subsidiaries and Wells Fargo Bank, National Association as Administrative Agent, the Swingline Bank and an Issuing Bank	10-K	10.13	February 28, 2013	
10.3*	Employment Terms dated October 29, 2001, between ACE Limited and Evan Greenberg	10-K	10.64	March 27, 2003	
10.4*	Employment Terms dated November 2, 2001, between ACE Limited and Philip V. Bancroft	10-K	10.65	March 27, 2003	
10.5*	Executive Severance Agreement between ACE Limited and Philip Bancroft, effective January 2, 2002	10-Q	10.1	May 10, 2004	
10.6*	Letter Regarding Executive Severance between ACE Limited and Philip V. Bancroft	10-K	10.17	February 25, 2011	
10.7*	Employment Terms dated April 10, 2006, between ACE and John Keogh	10-K	10.29	February 29, 2008	
10.8*	Executive Severance Agreement between ACE and John Keogh	10-K	10.30	February 29, 2008	
10.9*	ACE Limited Executive Severance Plan as amended effective May 18, 2011	10-K	10.21	February 24, 2012	
10.10*	Form of employment agreement between the Company (or subsidiaries of the Company) and executive officers of the Company to allocate a percentage of aggregate salary to the Company (or subsidiaries of the Company)	8-K	10.1	July 16, 2008	
10.11*	Outside Directors Compensation Parameters				X
10.12*	ACE Limited Elective Deferred Compensation Plan (as amended and restated effective January 1, 2005)	10-K	10.24	March 16, 2006	
10.13*	ACE USA Officer Deferred Compensation Plan (as amended through January 1, 2001)	10-K	10.25	March 16, 2006	
10.14*	ACE USA Officer Deferred Compensation Plan (as amended and restated effective January 1, 2011)	10-Q	10.7	October 30, 2013	
10.15*	ACE USA Officer Deferred Compensation Plan (as amended and restated effective January 1, 2009)	10-K	10.36	February 27, 2009	
10.16*	First Amendment to the Amended and Restated ACE USA Officers Deferred Compensation Plan	10-K	10.28	February 25, 2010	
10.17*	Form of Swiss Mandatory Retirement Benefit Agreement (for Swiss-employed named executive officers)	10-Q	10.2	May 7, 2010	
10.18*	ACE Limited Supplemental Retirement Plan (as amended and restated effective July 1, 2001)	10-Q	10.1	November 14, 2001	
10.19*	ACE Limited Supplemental Retirement Plan (as amended and restated effective January 1, 2011)	10-Q	10.6	October 30, 2013	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
10.20*	Amendments to the ACE Limited Supplemental Retirement Plan and the ACE Limited Elective Deferred Compensation Plan	10-K	10.38	February 29, 2008	
10.21*	ACE Limited Elective Deferred Compensation Plan (as amended and restated effective January 1, 2009)	10-K	10.39	February 27, 2009	
10.22*	ACE Limited Elective Deferred Compensation Plan (as amended and restated effective January 1, 2011)	10-Q	10.5	October 30, 2013	
10.23*	Deferred Compensation Plan amendments, effective January 1, 2009	10-K	10.40	February 27, 2009	
10.24*	Amendment to the ACE Limited Supplemental Retirement Plan	10-K	10.39	February 29, 2008	
10.25*	Amendment and restated ACE Limited Supplemental Retirement Plan, effective January 1, 2009	10-K	10.42	February 27, 2009	
10.26*	ACE USA Supplemental Employee Retirement Savings Plan (see exhibit 10.6 to Form 10-Q filed with the SEC on May 15, 2000)	10-Q	10.6	May 15, 2000	
10.27*	ACE USA Supplemental Employee Retirement Savings Plan (as amended through the Second Amendment)	10-K	10.30	March 1, 2007	
10.28*	ACE USA Supplemental Employee Retirement Savings Plan (as amended through the Third Amendment)	10-K	10.31	March 1, 2007	
10.29*	ACE USA Supplemental Employee Retirement Savings Plan (as amended and restated)	10-K	10.46	February 27, 2009	
10.30*	First Amendment to the Amended and Restated ACE USA Supplemental Employee Retirement Savings Plan	10-K	10.39	February 25, 2010	
10.31*	The ACE Limited 1995 Outside Directors Plan (as amended through the Seventh Amendment)	10-Q	10.1	August 14, 2003	
10.32*	ACE Limited 1998 Long-Term Incentive Plan (as amended through the Fourth Amendment)	10-K	10.34	March 1, 2007	
10.33*	ACE Limited 2004 Long-Term Incentive Plan (as amended through the Fifth Amendment)	8-K	10	May 21, 2010	
10.34*	ACE Limited 2004 Long-Term Incentive Plan (as amended through the Sixth Amendment)	8-K	10.1	May 20, 2013	
10.35*	ACE Limited Rules of the Approved U.K. Stock Option Program (see exhibit 10.2 to Form 10-Q filed with the SEC on February 13, 1998)	10-Q	10.2	February 13, 1998	
10.36*	Form of Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-K	10.54	February 27, 2009	
10.37*	Form of Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-K	10.55	February 27, 2009	
10.38*	Director Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.1	November 9, 2009	
10.39*	Form of Restricted Stock Unit Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.1	May 8, 2008	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
10.40*	Form of Restricted Stock Unit Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.2	May 8, 2008	
10.41*	Form of Restricted Stock Unit Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-K	10.60	February 27, 2009	
10.42*	Form of Restricted Stock Unit Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.2	October 30, 2013	
10.43*	Form of Restricted Stock Unit Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Chief Executive Officer, Chief Financial Officer and the General Counsel	10-K	10.56	February 28, 2014	
10.44*	Form of Incentive Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	8-K	10.4	September 13, 2004	
10.45*	Form of Incentive Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.4	May 8, 2008	
10.46*	Form of Incentive Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-K	10.63	February 27, 2009	
10.47*	Form of Incentive Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.3	October 30, 2013	
10.48*	Form of Non-Qualified Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	8-K	10.5	September 13, 2004	
10.49*	Form of Non-Qualified Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.3	May 8, 2008	
10.50*	Form of Non-Qualified Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.4	October 30, 2013	
10.51*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan, as updated through May 4, 2006	10-Q	10.3	May 5, 2006	
10.52*	Revised Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.2	November 8, 2006	
10.53*	Revised Form of Performance Based Restricted Stock Award Terms under The ACE Limited 2004 Long-Term Incentive Plan	10-K	10.65	February 25, 2011	
10.54*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-K	10.67	February 28, 2014	
10.55*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Chief Executive Officer, Chief Financial Officer and the General Counsel	10-K	10.68	February 28, 2014	
10.56*	Form of Restricted Stock Unit Award Terms (for outside directors) under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.2	November 7, 2007	
10.57*	Form of Restricted Stock Unit Award Terms (for outside directors) under the ACE Limited 2004 Long-Term Incentive Plan	10-Q	10.2	August 7, 2009	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
10.58*	Form of Incentive Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan for Messrs. Greenberg and Cusumano	10-Q	10.1	August 4, 2011	
10.59*	Form of Non-Qualified Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan for Messrs. Greenberg and Cusumano	10-Q	10.2	August 4, 2011	
10.60*	Form of Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Messrs. Greenberg and Cusumano	10-Q	10.3	August 4, 2011	
10.61*	ACE Limited Employee Stock Purchase Plan, as amended	8-K	10.1	May 22, 2012	
10.62*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Messrs. Greenberg and Cusumano	10-K	10.72	February 24, 2012	
10.63*	Form of Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.68	February 27, 2015	
10.64*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.69	February 27, 2015	
10.65*	Form of Restricted Stock Unit Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.70	February 27, 2015	
10.66*	Form of Incentive Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.71	February 27, 2015	
10.67*	Form of Non-Qualified Stock Option Terms under the ACE Limited 2004 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.72	February 27, 2015	
10.68*	Form of Executive Management Non-Competition Agreement	8-K	10.1	May 22, 2015	
10.69	Commitment Increase Agreement to increase the credit capacity under the Credit Agreement originally entered into on November 6, 2012 to $1,500,000,000 under the Senior Unsecured Letter of Credit Facility, dated as of December 11, 2015, among ACE Limited, and certain subsidiaries, and Wells Fargo Bank, National Association as Administrative Agent, the Swingline Bank and an Issuing Bank	10-K	10.72	February 26, 2016	
10.70*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan	10-K	10.73	February 26, 2016	
10.71*	Form of Performance Based Restricted Stock Award Terms under the ACE Limited 2004 Long-Term Incentive Plan for Special Award for Messrs. Greenberg and Keogh	10-K	10.74	February 26, 2016	
10.72*	Chubb Limited 2016 Long-Term Incentive Plan	S-8	4.4	May 26, 2016	
10.73*	Form of Incentive Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan	10-Q	10.2	August 5, 2016	
10.74*	Form of Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan	10-Q	10.3	August 5, 2016	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
10.75*	Form of Restricted Stock Unit Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan	10-Q	10.4	August 5, 2016	
10.76*	Form of Non-Qualified Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan	10-Q	10.5	August 5, 2016	
10.77*	Form of Incentive Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-Q	10.6	August 5, 2016	
10.78*	Form of Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-Q	10.7	August 5, 2016	
10.79*	Form of Restricted Stock Unit Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-Q	10.8	August 5, 2016	
10.80*	Form of Non-Qualified Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-Q	10.9	August 5, 2016	
10.81*	Form of Performance Based Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.84	February 28, 2017	
10.82*	Form of Performance Based Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan	10-K	10.85	February 28, 2017	
10.83*	Chubb Limited Employee Stock Purchase Plan, as amended and restated	S-8	4.4	May 25, 2017	
10.84*	Director Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan	10-Q	10.1	August 3, 2017	
10.85	Amended and Restated Credit Agreement for $1,000,000 Senior Unsecured Letter of Credit Facility, dated as of October 25, 2017, among Chubb Limited, and certain subsidiaries and Wells Fargo Bank, National Association as Administrative Agent, the Swingline Bank and an Issuing Bank	10-K	10.88	February 23, 2018	
10.86*	Form of Incentive Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Executive Officers	10-K	10.89	February 23, 2018	
10.87*	Form of Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Executive Officers	10-K	10.90	February 23, 2018	
10.88*	Form of Performance Based Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Executive Officers	10-K	10.91	February 23, 2018	
10.89*	Form of Non-Qualified Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Executive Officers	10-K	10.92	February 23, 2018	
10.90*	Form of Restricted Stock Unit Award Terms under the Chubb Limited 2016 Long-Term Plan for Executive Officers	10-K	10.93	February 23, 2018	
10.91*	Form of Incentive Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.94	February 23, 2018	
10.92*	Form of Non-Qualified Stock Option Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.95	February 23, 2018	

Exhibit Number	Exhibit Description	Incorporated by Reference Form	Original Number	Date Filed	Filed Herewith
10.93*	Form of Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.96	February 23, 2018	
10.94*	Form of Restricted Stock Unit Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.97	February 23, 2018	
10.95*	Form of Performance Based Restricted Stock Award Terms under the Chubb Limited 2016 Long-Term Incentive Plan for Swiss Executive Management	10-K	10.98	February 23, 2018	
10.96*	Chubb Limited Clawback Policy	10-K	10.99	February 23, 2018	
21.1	Subsidiaries of the Company				X
23.1	Consent of Independent Registered Public Accounting Firm				X
31.1	Certification Pursuant to Section 302 of The Sarbanes-Oxley Act of 2002				X
31.2	Certification Pursuant to Section 302 of The Sarbanes-Oxley Act of 2002				X
32.1	Certification Pursuant to 18 U.S.C. Section 1350, As Adopted Pursuant to Section 906 of The Sarbanes-Oxley Act of 2002				X
32.2	Certification Pursuant to 18 U.S.C. Section 1350, As Adopted Pursuant to Section 906 of The Sarbanes-Oxley Act of 2002				X
101	The following financial information from Chubb Limited's Annual Report on Form 10-K for the year ended December 31, 2019, formatted in Inline XBRL: (i) Consolidated Balance Sheets at December 31, 2019 and 2018; (ii) Consolidated Statements of Operations and Comprehensive Income for the years ended December 31, 2019, 2018, and 2017; (iii) Consolidated Statements of Shareholders' Equity for the years ended December 31, 2019, 2018, and 2017; (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018, and 2017; and (v) Notes to the Consolidated Financial Statements				X
104	The Cover Page Interactive Data File formatted in Inline XBRL (The cover page XBRL tags are embedded in the Inline XBRL document and included in Exhibit 101)				

* Management contract, compensatory plan or arrangement

ITEM 16. Form 10-K Summary

None.

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.

CHUBB LIMITED

By: /s/ Philip V. Bancroft

Philip V. Bancroft
Executive Vice President and Chief Financial Officer

February 27, 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.

Signature	Title	Date
/s/ Evan G. Greenberg **Evan G. Greenberg**	Chairman, President, Chief Executive Officer, and Director	February 27, 2020
/s/ Philip V. Bancroft **Philip V. Bancroft**	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 27, 2020
/s/ Paul B. Medini **Paul B. Medini**	Chief Accounting Officer (Principal Accounting Officer)	February 27, 2020
/s/ Michael G. Atieh **Michael G. Atieh**	Director	February 27, 2020
/s/ Sheila P. Burke **Sheila P. Burke**	Director	February 27, 2020
/s/ James I. Cash **James I. Cash**	Director	February 27, 2020
/s/ Mary A. Cirillo **Mary A. Cirillo**	Director	February 27, 2020
/s/ Michael P. Connors **Michael P. Connors**	Director	February 27, 2020

Signature	Title	Date
/s/ John Edwardson **John Edwardson**	Director	February 27, 2020
/s/ Robert M. Hernandez **Robert M. Hernandez**	Director	February 27, 2020
/s/ Kimberly Ross **Kimberly Ross**	Director	February 27, 2020
/s/ Robert W. Scully **Robert W. Scully**	Director	February 27, 2020
/s/ Eugene B. Shanks, Jr. **Eugene B. Shanks, Jr.**	Director	February 27, 2020
/s/ Theodore E. Shasta **Theodore E. Shasta**	Director	February 27, 2020
/s/ David Sidwell **David Sidwell**	Director	February 27, 2020
/s/ Olivier Steimer **Olivier Steimer**	Director	February 27, 2020

CHUBB LIMITED AND SUBSIDIARIES

CONSOLIDATED FINANCIAL STATEMENTS

December 31, 2019

Chubb Limited
INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

MANAGEMENT'S RESPONSIBILITY FOR FINANCIAL STATEMENTS AND INTERNAL CONTROL OVER FINANCIAL REPORTING

Financial Statements

The consolidated financial statements of Chubb Limited (Chubb) were prepared by management, which is responsible for their reliability and objectivity. The statements have been prepared in conformity with accounting principles generally accepted in the United States of America and, as such, include amounts based on informed estimates and judgments of management. Financial information elsewhere in this annual report is consistent with that in the consolidated financial statements.

The Board of Directors (Board), operating through its Audit Committee, which is composed entirely of directors who are not officers or employees of Chubb, provides oversight of the financial reporting process and safeguarding of assets against unauthorized acquisition, use or disposition. The Audit Committee annually recommends the appointment of an independent registered public accounting firm and submits its recommendation to the Board for approval.

The Audit Committee meets with management, the independent registered public accountants and the internal auditor; approves the overall scope of audit work and related fee arrangements; and reviews audit reports and findings. In addition, the independent registered public accountants and the internal auditor meet separately with the Audit Committee, without management representatives present, to discuss the results of their audits; the adequacy of Chubb's internal control; the quality of its financial reporting; and the safeguarding of assets against unauthorized acquisition, use or disposition.

The consolidated financial statements have been audited by an independent registered public accounting firm, PricewaterhouseCoopers LLP, which has been given access to all financial records and related data, including minutes of all meetings of the Board and committees of the Board. Chubb believes that all representations made to our independent registered public accountants during their audits were valid and appropriate.

Management's Report on Internal Control over Financial Reporting

The management of Chubb is responsible for establishing and maintaining adequate internal control over financial reporting. Pursuant to the rules and regulations of the Securities and Exchange Commission, internal control over financial reporting is a process designed by, or under the supervision of our Chief Executive Officer and Chief Financial Officer to provide reasonable assurance regarding the reliability of financial reporting and the preparation of our consolidated financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America.

As of December 31, 2019, management has evaluated the effectiveness of Chubb's internal control over financial reporting based on the criteria for effective internal control over financial reporting established in “Internal Control - Integrated Framework,” issued by the Committee of Sponsoring Organizations of the Treadway Commission in 2013. Based on this evaluation, we have concluded that Chubb's internal control over financial reporting was effective as of December 31, 2019.

PricewaterhouseCoopers LLP, the independent registered public accounting firm that audited the consolidated financial statements of Chubb included in this Annual Report, has issued a report on the effectiveness of Chubb's internal controls over financial reporting as of December 31, 2019. The report, which expresses an unqualified opinion on the effectiveness of Chubb's internal control over financial reporting as of December 31, 2019, is included in this Item under “Report of Independent Registered Public Accounting Firm” and follows this statement.

/s/ Evan G. Greenberg	/s/ Philip V. Bancroft
Evan G. Greenberg	Philip V. Bancroft
Chairman, President and Chief Executive Officer	Executive Vice President and Chief Financial Officer

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of Chubb Limited

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Chubb Limited and its subsidiaries (the "Company") as of December 31, 2019 and 2018, and the related consolidated statements of operations and comprehensive income, of 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 the accompanying Management’s Report on Internal Control over Financial Reporting. 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.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

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

Critical Audit Matters

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

Valuation of Unpaid Losses and Loss Expenses, Net of Reinsurance

As described in Note 7 to the consolidated financial statements, as of December 31, 2019, the Company's liability for unpaid losses and loss expenses, net of reinsurance, was approximately $48.5 billion. The majority of the Company's net unpaid losses and loss expenses arise from the Company's long-tail casualty business (such as general liability and professional liability), U.S. sourced workers' compensation, asbestos-related, environmental pollution and other exposures with high estimation uncertainty. The process of establishing loss reserves requires the use of estimates and judgments based on circumstances underlying the insured loss at the date of accrual. The judgments involved in projecting the ultimate losses include the use and interpretation of various standard actuarial reserving methods that place reliance on the extrapolation of actual historical data, loss development patterns, industry data, and other benchmarks as appropriate. The reserves for the various product lines each require different qualitative and quantitative assumptions and judgments, including changes in business mix or volume, changes in ceded reinsurance structures, changes in claims handling practices, reported and projected loss trends, inflation, the legal environment, and the terms and conditions of the contracts sold to the Company's insured parties.

The principal considerations for our determination that performing procedures relating to the valuation of unpaid losses and loss expenses, net of reinsurance, from the long-tail and other exposures as described above, is a critical audit matter are (i) there was significant judgment by management in determining the reserve liability which in turn led to a high degree of auditor subjectivity and judgment in performing procedures relating to the valuation; (ii) there was significant auditor effort and judgment in evaluating the audit evidence relating to the actuarial reserving methods and assumptions related to extrapolation of actual historical data, loss development patterns, industry data, other benchmarks, and the impact of qualitative and quantitative subjective factors; 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 Company's valuation of unpaid losses and loss expenses, net of reinsurance, including controls over the selection of actuarial methodologies and development of significant 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) independently estimating reserves on a sample basis using actual historical data and loss development patterns, as well as industry data and other benchmarks, to develop an independent estimate and comparing the independent estimate to management's actuarially determined reserves; and (ii) evaluating management's actuarial reserving methodologies and aforementioned assumptions, as well as assessing qualitative adjustments to carried reserves and the consistency of management's approach period-over-period. Performing these procedures involved testing the completeness and accuracy of data provided by management.

Valuation of Level 3 Investments in the Valuation Hierarchy

As described in Note 4 to the consolidated financial statements, as of December 31, 2019, the Company had total assets measured at fair value of approximately $96 billion, of which $2 billion were categorized as level 3 in the valuation hierarchy. The level 3 investments are measured at fair value using inputs that are unobservable and reflect management's judgments about assumptions that market participants would use in pricing or, for certain of the investments, management obtains and evaluates a single broker quote, which is typically from a market maker. As described by management, the valuation is more subjective when markets are less liquid due to the lack of market based inputs (i.e., stale pricing), which may increase the potential that an investment's estimated fair value is not reflective of the price at which an actual transaction would occur.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The principal considerations for our determination that performing procedures relating to the valuation of level 3 investments in the valuation hierarchy is a critical audit matter are (i) there was significant judgment by management in determining the fair value of these investments as they are measured using inputs that are unobservable and are likely to be priced using models or inputs other than quoted prices which in turn led to a high degree of auditor subjectivity and judgment in performing procedures relating to the estimate; and (ii) 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 the controls relating to the valuation of level 3 investments. These procedures also included, among others, obtaining pricing from sources other than those used by management for a sample of securities and comparing management's estimate to the prices independently obtained, and the involvement of professionals with specialized skill and knowledge to assist in developing an independent range of estimates for a sample of securities and comparing management's estimate to the independently developed ranges.

/s/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Philadelphia, PA
February 27, 2020

We have served as the Company's auditor since 1985, which includes periods before the Company became subject to SEC reporting requirements.

CONSOLIDATED BALANCE SHEETS
Chubb Limited and Subsidiaries

(in millions of U.S. dollars, except share and per share data)	December 31 2019	December 31 2018
Assets		
Investments		
Fixed maturities available for sale, at fair value (amortized cost – $82,580 and $79,323)	$ 85,488	$ 78,470
Fixed maturities held to maturity, at amortized cost (fair value – $13,005 and $13,259)	12,581	13,435
Equity securities, at fair value	812	770
Short-term investments, at fair value and amortized cost	4,291	3,016
Other investments, at fair value	6,062	5,277
Total investments	109,234	100,968
Cash	1,537	1,247
Restricted cash	109	93
Securities lending collateral	994	1,926
Accrued investment income	867	883
Insurance and reinsurance balances receivable	10,357	10,075
Reinsurance recoverable on losses and loss expenses	15,181	15,993
Reinsurance recoverable on policy benefits	197	202
Deferred policy acquisition costs	5,242	4,922
Value of business acquired	306	295
Goodwill	15,296	15,271
Other intangible assets	6,063	6,143
Prepaid reinsurance premiums	2,647	2,544
Investments in partially-owned insurance companies	1,332	678
Other assets	7,581	6,531
Total assets	$ 176,943	$ 167,771
Liabilities		
Unpaid losses and loss expenses	$ 62,690	$ 62,960
Unearned premiums	16,771	15,532
Future policy benefits	5,814	5,506
Insurance and reinsurance balances payable	6,184	6,437
Securities lending payable	994	1,926
Accounts payable, accrued expenses, and other liabilities	11,773	10,472
Deferred tax liabilities	804	304
Repurchase agreements	1,416	1,418
Short-term debt	1,299	509
Long-term debt	13,559	12,087
Trust preferred securities	308	308
Total liabilities	121,612	117,459
Commitments and contingencies (refer to Note 10)		
Shareholders' equity		
Common Shares (CHF 24.15 par value; 479,783,864 shares issued; 451,971,567 and 459,203,378 shares outstanding)	11,121	11,121
Common Shares in treasury (27,812,297 and 20,580,486 shares)	(3,754)	(2,618)
Additional paid-in capital	11,203	12,557
Retained earnings	36,142	31,700
Accumulated other comprehensive income (loss) (AOCI)	619	(2,448)
Total shareholders' equity	55,331	50,312
Total liabilities and shareholders' equity	$ 176,943	$ 167,771

See accompanying notes to the consolidated financial statements

CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE INCOME

Chubb Limited and Subsidiaries

For the years ended December 31, 2019, 2018, and 2017 (in millions of U.S. dollars, except per share data)	2019	2018	2017
Revenues			
Net premiums written	$ 32,275	$ 30,579	$ 29,244
Increase in unearned premiums	(985)	(515)	(210)
Net premiums earned	31,290	30,064	29,034
Net investment income	3,426	3,305	3,125
Net realized gains (losses):			
Other-than-temporary impairment (OTTI) losses gross	(90)	(52)	(46)
Portion of OTTI losses recognized in other comprehensive income (OCI)	32	3	1
Net OTTI losses recognized in income	(58)	(49)	(45)
Net realized gains (losses) excluding OTTI losses	(472)	(603)	129
Total net realized gains (losses) (includes $(31), $(302), and $(15) reclassified from AOCI)	(530)	(652)	84
Total revenues	34,186	32,717	32,243
Expenses			
Losses and loss expenses	18,730	18,067	18,454
Policy benefits	740	590	676
Policy acquisition costs	6,153	5,912	5,781
Administrative expenses	3,030	2,886	2,833
Interest expense	552	641	607
Other (income) expense	(596)	(434)	(400)
Amortization of purchased intangibles	305	339	260
Chubb integration expenses	23	59	310
Total expenses	28,937	28,060	28,521
Income before income tax	5,249	4,657	3,722
Income tax expense (benefit) (includes nil, $(41), and $(13) on reclassified unrealized gains and losses)	795	695	(139)
Net income	$ 4,454	$ 3,962	$ 3,861
Other comprehensive income (loss)			
Unrealized appreciation (depreciation)	$ 3,704	$ (2,298)	$ 618
Reclassification adjustment for net realized (gains) losses included in net income	31	302	15
	3,735	(1,996)	633
Change in:			
Cumulative foreign currency translation adjustment	13	(802)	471
Postretirement benefit liability adjustment	(76)	(321)	(16)
Other comprehensive income (loss), before income tax	3,672	(3,119)	1,088
Income tax (expense) benefit related to OCI items	(605)	399	(231)
Other comprehensive income (loss)	3,067	(2,720)	857
Comprehensive income	$ 7,521	$ 1,242	$ 4,718
Earnings per share			
Basic earnings per share	$ 9.77	$ 8.55	$ 8.26
Diluted earnings per share	$ 9.71	$ 8.49	$ 8.19

See accompanying notes to the consolidated financial statements

CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY

Chubb Limited and Subsidiaries

For the years ended December 31, 2019, 2018, and 2017 (in millions of U.S. dollars)	2019	2018	2017
Common Shares			
Balance – beginning and end of year	**$ 11,121**	$ 11,121	$ 11,121
Common Shares in treasury			
Balance – beginning of year	**(2,618)**	(1,944)	(1,480)
Common Shares repurchased	**(1,531)**	(1,021)	(830)
Net shares issued under employee share-based compensation plans	**395**	347	366
Balance – end of year	**(3,754)**	(2,618)	(1,944)
Additional paid-in capital			
Balance – beginning of year	**12,557**	13,978	15,335
Net shares issued under employee share-based compensation plans	**(178)**	(313)	(313)
Exercise of stock options	**(82)**	(49)	(58)
Share-based compensation expense	**266**	285	331
Funding of dividends declared to Retained earnings	**(1,360)**	(1,344)	(1,317)
Balance – end of year	**11,203**	12,557	13,978
Retained earnings			
Balance – beginning of year	**31,700**	27,474	23,613
Cumulative effect of adoption of accounting standards (refer to Note 1)	**(12)**	264	—
Balance – beginning of year, as adjusted	**31,688**	27,738	23,613
Net income	**4,454**	3,962	3,861
Funding of dividends declared from Additional paid-in capital	**1,360**	1,344	1,317
Dividends declared on Common Shares	**(1,360)**	(1,344)	(1,317)
Balance – end of year	**36,142**	31,700	27,474
Accumulated other comprehensive income (loss)			
Net unrealized appreciation (depreciation) on investments			
Balance – beginning of year	**(545)**	1,450	1,058
Cumulative effect of adoption of accounting standards	**—**	(296)	—
Balance – beginning of year, as adjusted	**(545)**	1,154	1,058
Change in year, before reclassification from AOCI, net of income tax (expense) benefit of $(647), $338, and $(228)	**3,057**	(1,960)	390
Amounts reclassified from AOCI, net of income tax (expense) benefit of nil, $(41), and $(13)	**31**	261	2
Change in year, net of income tax (expense) benefit of $(647), $297, and $(241)	**3,088**	(1,699)	392
Balance – end of year	**2,543**	(545)	1,450
Cumulative foreign currency translation adjustment			
Balance – beginning of year	**(1,976)**	(1,187)	(1,663)
Cumulative effect of adoption of accounting standards	**—**	(22)	—
Balance – beginning of year, as adjusted	**(1,976)**	(1,209)	(1,663)
Change in year, net of income tax benefit of $24, $35, and $5	**37**	(767)	476
Balance – end of year	**(1,939)**	(1,976)	(1,187)
Postretirement benefit liability adjustment			
Balance – beginning of year	**73**	280	291
Cumulative effect of adoption of accounting standards	**—**	47	—
Balance – beginning of year, as adjusted	**73**	327	291
Change in year, net of income tax benefit of $18, $67, and $5	**(58)**	(254)	(11)
Balance – end of year	**15**	73	280
Accumulated other comprehensive income (loss)	**619**	(2,448)	543
Total shareholders' equity	**$ 55,331**	$ 50,312	$ 51,172

See accompanying notes to the consolidated financial statements

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CONSOLIDATED STATEMENTS OF CASH FLOWS
Chubb Limited and Subsidiaries

For the years ended December 31, 2019, 2018, and 2017 (in millions of U.S. dollars)	2019	2018	2017
Cash flows from operating activities			
Net income	**$ 4,454**	$ 3,962	$ 3,861
Adjustments to reconcile net income to net cash flows from operating activities			
Net realized (gains) losses	**530**	652	(84)
Amortization of premiums/discounts on fixed maturities	**395**	592	694
Amortization of purchased intangibles	**305**	339	260
Deferred income taxes	**(97)**	16	(527)
Unpaid losses and loss expenses	**(257)**	570	2,137
Unearned premiums	**1,051**	654	264
Future policy benefits	**215**	235	217
Insurance and reinsurance balances payable	**(302)**	722	271
Accounts payable, accrued expenses, and other liabilities	**(207)**	375	(517)
Income taxes payable	**(7)**	161	(365)
Insurance and reinsurance balances receivable	**(270)**	(981)	(243)
Reinsurance recoverable	**838**	(1,165)	(1,248)
Deferred policy acquisition costs	**(344)**	(301)	(317)
Other	**38**	(351)	100
Net cash flows from operating activities	**6,342**	5,480	4,503
Cash flows from investing activities			
Purchases of fixed maturities available for sale	**(25,846)**	(24,700)	(25,720)
Purchases of to be announced mortgage-backed securities	**—**	(35)	(27)
Purchases of fixed maturities held to maturity	**(229)**	(456)	(352)
Purchases of equity securities	**(531)**	(207)	(173)
Sales of fixed maturities available for sale	**13,110**	14,001	13,228
Sales of to be announced mortgage-backed securities	**6**	29	27
Sales of equity securities	**611**	315	187
Maturities and redemptions of fixed maturities available for sale	**9,039**	7,352	10,425
Maturities and redemptions of fixed maturities held to maturity	**946**	1,124	879
Net change in short-term investments	**(1,117)**	516	(537)
Net derivative instruments settlements	**(703)**	16	(265)
Private equity contributions	**(1,315)**	(1,337)	(648)
Private equity distributions	**1,390**	980	1,084
Acquisition of subsidiaries (net of cash acquired of $45, nil, and nil)	**(29)**	—	—
Other	**(1,237)**	(533)	(530)
Net cash flows used for investing activities	**(5,905)**	(2,935)	(2,422)
Cash flows from financing activities			
Dividends paid on Common Shares	**(1,354)**	(1,337)	(1,308)
Common Shares repurchased	**(1,530)**	(1,044)	(801)
Proceeds from issuance of long-term debt	**2,828**	2,171	—
Proceeds from issuance of repurchase agreements	**2,817**	2,029	2,353
Repayment of long-term debt	**(510)**	(2,001)	(501)
Repayment of repurchase agreements	**(2,817)**	(2,019)	(2,348)
Proceeds from share-based compensation plans	**204**	115	151
Policyholder contract deposits	**514**	453	442
Policyholder contract withdrawals	**(303)**	(358)	(307)
Net cash flows used for financing activities	**(151)**	(1,991)	(2,319)
Effect of foreign currency rate changes on cash and restricted cash	**20**	(65)	1
Net increase (decrease) in cash and restricted cash	**306**	489	(237)
Cash and restricted cash – beginning of year	**1,340**	851	1,088
Cash and restricted cash – end of year	**$ 1,646**	$ 1,340	$ 851
Supplemental cash flow information			
Taxes paid	**$ 912**	$ 503	$ 736
Interest paid	**$ 512**	$ 621	$ 644

See accompanying notes to the consolidated financial statements

1. Summary of significant accounting policies

a) Basis of presentation

Chubb Limited is a holding company incorporated in Zurich, Switzerland. Chubb Limited, through its subsidiaries, provides a broad range of insurance and reinsurance products to insureds worldwide. Our results are reported through the following business segments: North America Commercial P&C Insurance, North America Personal P&C Insurance, North America Agricultural Insurance, Overseas General Insurance, Global Reinsurance, and Life Insurance. Refer to Note 15 for additional information.

The accompanying consolidated financial statements, which include the accounts of Chubb Limited and its subsidiaries (collectively, Chubb, we, us, or our), have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP) and, in the opinion of management, reflect all adjustments necessary for a fair statement of the results and financial position for such periods. All significant intercompany accounts and transactions, including internal reinsurance transactions, have been eliminated.

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, 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. Amounts included in the Consolidated financial statements reflect our best estimates and assumptions; actual amounts could differ materially from these estimates. Chubb's principal estimates include:

- unpaid loss and loss expense reserves, including long-tail asbestos and environmental (A&E) reserves and non-A&E casualty exposures;
- future policy benefits reserves;
- amortization of deferred policy acquisition costs and value of business acquired (VOBA);
- reinsurance recoverable, including a provision for uncollectible reinsurance;
- the assessment of risk transfer for certain structured insurance and reinsurance contracts;
- the valuation of the investment portfolio and assessment of other than temporary impairment (OTTI);
- the valuation of deferred income taxes;
- the valuation of derivative instruments related to guaranteed living benefits (GLB);
- the valuation and amortization of purchased intangibles; and
- the assessment of goodwill for impairment.

b) Premiums

Premiums are generally recorded as written upon inception of the policy. For multi-year policies for which premiums written are payable in annual installments, only the current annual premium is included as written at policy inception due to the ability of the insured/reinsured to commute or cancel coverage within the policy term. The remaining annual premiums are recorded as written at each successive anniversary date within the multi-year term.

For property and casualty (P&C) insurance and reinsurance products, premiums written are primarily earned on a pro-rata basis over the policy terms to which they relate. Unearned premiums represent the portion of premiums written applicable to the unexpired portion of the policies in force. For retrospectively-rated policies, written premiums are adjusted to reflect expected ultimate premiums consistent with changes to incurred losses, or other measures of exposure as stated in the policy, and earned over the policy coverage period.

Mandatory reinstatement premiums assessed on reinsurance policies are earned in the period of the loss event that gave rise to the reinstatement premiums. All remaining unearned premiums are recognized over the remaining coverage period.

Premiums from long-duration contracts such as certain traditional term life, whole life, endowment, and long-duration personal accident and health (A&H) policies are generally recognized as revenue when due from policyholders. Traditional life policies include those contracts with fixed and guaranteed premiums and benefits. Benefits and expenses are matched with income to result in the recognition of profit over the life of the contracts.

Retroactive loss portfolio transfer (LPT) contracts in which the insured loss events occurred prior to contract inception are evaluated to determine whether they meet criteria for reinsurance accounting. If reinsurance accounting is appropriate, written premiums are fully earned and corresponding losses and loss expenses recognized at contract inception. These contracts can cause significant variances in gross premiums written, net premiums written, net premiums earned, and net incurred losses in the years in which they are written. Reinsurance contracts sold not meeting the criteria for reinsurance accounting are recorded using the deposit method as described below in Note 1 k).

Reinsurance premiums assumed are based on information provided by ceding companies supplemented by our own estimates of premium when we have not received ceding company reports. Estimates are reviewed and adjustments are recorded in the period in which they are determined. Premiums are earned over the coverage terms of the related reinsurance contracts and range from one to three years.

c) Deferred policy acquisition costs and value of business acquired
Policy acquisition costs consist of commissions (direct and ceded), premium taxes, and certain underwriting costs related directly to the successful acquisition of new or renewal insurance contracts. A VOBA intangible asset is established upon the acquisition of blocks of long-duration contracts in a business combination and represents the present value of estimated net cash flows for the contracts in force at the acquisition date. Acquisition costs and VOBA, collectively policy acquisition costs, are deferred and amortized. Amortization is recorded in Policy acquisition costs in the Consolidated statements of operations. Policy acquisition costs on P&C contracts are generally amortized ratably over the period in which premiums are earned. Policy acquisition costs on traditional long-duration contracts are amortized over the estimated life of the contracts, generally in proportion to premium revenue recognized based upon the same assumptions used in estimating the liability for future policy benefits. For non-traditional long-duration contracts, we amortize policy acquisition costs over the expected life of the contracts in proportion to expected gross profits. The effect of changes in estimates of expected gross profits is reflected in the period the estimates are revised. Policy acquisition costs are reviewed to determine if they are recoverable from future income, including investment income. Unrecoverable policy acquisition costs are expensed in the period identified.

Advertising costs are expensed as incurred except for direct-response campaigns that qualify for cost deferral, principally related to long-duration A&H business produced by the Overseas General Insurance segment, which are deferred and recognized as a component of Policy acquisition costs. For individual direct-response marketing campaigns that we can demonstrate have specifically resulted in incremental sales to customers and such sales have probable future economic benefits, incremental costs directly related to the marketing campaigns are capitalized as Deferred policy acquisition costs. Deferred policy acquisition costs, including deferred marketing costs, are reviewed regularly for recoverability from future income, including investment income, and amortized in proportion to premium revenue recognized, primarily over a ten-year period, the expected economic future benefit period based upon the same assumptions used in estimating the liability for future policy benefits. The expected future benefit period is evaluated periodically based on historical results and adjusted prospectively. The amount of deferred marketing costs reported in Deferred policy acquisition costs in the Consolidated balance sheets was $246 million and $255 million at December 31, 2019 and 2018, respectively. Amortization expense for deferred marketing costs was $109 million, $114 million, and $116 million for the years ended December 31, 2019, 2018, and 2017, respectively.

d) Reinsurance
Chubb assumes and cedes reinsurance with other insurance companies to provide greater diversification of business and minimize the net loss potential arising from large risks. Ceded reinsurance contracts do not relieve Chubb of its primary obligation to policyholders.

For both ceded and assumed reinsurance, risk transfer requirements must be met in order to account for a contract as reinsurance, principally resulting in the recognition of cash flows under the contract as premiums and losses. To meet risk transfer requirements, a reinsurance contract must include insurance risk, consisting of both underwriting and timing risk, and a reasonable possibility of a significant loss for the assuming entity. To assess risk transfer for certain contracts, Chubb generally develops expected discounted cash flow analyses at contract inception. Deposit accounting is used for contracts that do not meet risk transfer requirements. Deposit accounting requires that consideration received or paid be recorded in the balance sheet as opposed to recording premiums written or losses incurred in the statement of operations. Non-refundable fees on deposit contracts are earned based on the terms of the contract described below in Note 1 k).

Reinsurance recoverable includes balances due from reinsurance companies for paid and unpaid losses and loss expenses and future policy benefits that will be recovered from reinsurers, based on contracts in force. The method for determining the reinsurance recoverable on unpaid losses and loss expenses incurred but not reported (IBNR) involves actuarial estimates consistent with those used to establish the associated liability for unpaid losses and loss expenses as well as a determination of Chubb's ability to cede unpaid losses and loss expenses under the terms of the reinsurance agreement.

Reinsurance recoverable is presented net of a provision for uncollectible reinsurance determined based upon a review of the financial condition of reinsurers and other factors. The provision for uncollectible reinsurance is based on an estimate of the reinsurance recoverable balance that will ultimately be unrecoverable due to reinsurer insolvency, a contractual dispute, or any other reason. The valuation of this provision includes several judgments including certain aspects of the allocation of reinsurance recoverable on IBNR claims by reinsurer and a default analysis to estimate uncollectible reinsurance. The primary components of the default analysis are reinsurance recoverable balances by reinsurer, net of collateral, and default factors used to determine the portion of a reinsurer's balance deemed uncollectible. The definition of collateral for this purpose requires some judgment and is generally limited to assets held in a Chubb-only beneficiary trust, letters of credit, and liabilities held with the same legal entity for which Chubb believes there is a contractual right of offset. The determination of the default factor is principally based on the financial strength rating of the reinsurer. Default factors require considerable judgment and are determined using the current financial strength rating, or rating equivalent, of each reinsurer as well as other key considerations and assumptions. The more significant considerations include, but are not necessarily limited to, the following:

- For reinsurers that maintain a financial strength rating from a major rating agency, and for which recoverable balances are considered representative of the larger population (i.e., default probabilities are consistent with similarly rated reinsurers and payment durations conform to averages), the financial rating is based on a published source and the default factor is based on published default statistics of a major rating agency applicable to the reinsurer's particular rating class. When a recoverable is expected to be paid in a brief period of time by a highly rated reinsurer, such as certain property catastrophe claims, a default factor may not be applied;
- For balances recoverable from reinsurers that are both unrated by a major rating agency and for which management is unable to determine a credible rating equivalent based on a parent, affiliate, or peer company, we determine a rating equivalent based on an analysis of the reinsurer that considers an assessment of the creditworthiness of the particular entity, industry benchmarks, or other factors as considered appropriate. We then apply the applicable default factor for that rating class. For balances recoverable from unrated reinsurers for which the ceded reserve is below a certain threshold, we generally apply a default factor of 34 percent, consistent with published statistics of a major rating agency;
- For balances recoverable from reinsurers that are either insolvent or under regulatory supervision, we establish a default factor and resulting provision for uncollectible reinsurance based on reinsurer-specific facts and circumstances. Upon initial notification of an insolvency, we generally recognize an expense for a substantial portion of all balances outstanding, net of collateral, through a combination of write-offs of recoverable balances and increases to the provision for uncollectible reinsurance. When regulatory action is taken on a reinsurer, we generally recognize a default factor by estimating an expected recovery on all balances outstanding, net of collateral. When sufficient credible information becomes available, we adjust the provision for uncollectible reinsurance by establishing a default factor pursuant to information received; and
- For other recoverables, management determines the provision for uncollectible reinsurance based on the specific facts and circumstances.

The methods used to determine the reinsurance recoverable balance and related provision for uncollectible reinsurance are regularly reviewed and updated, and any resulting adjustments are reflected in earnings in the period identified.

The methods used to determine the provision for uncollectible high deductible recoverable amounts are similar to the processes used to determine the provision for uncollectible reinsurance recoverable. For additional information on high deductible policies, refer to section k) Unpaid losses and loss expenses, below.

Prepaid reinsurance premiums represent the portion of premiums ceded to reinsurers applicable to the unexpired coverage terms of the reinsurance contracts in-force.

The value of reinsurance business assumed of $6 million and $14 million at December 31, 2019 and 2018, respectively, included in Other assets in the accompanying Consolidated balance sheets, represents the excess of estimated ultimate value of the liabilities assumed under retroactive reinsurance contracts over consideration received. The value of reinsurance business assumed is amortized and recorded to Losses and loss expenses based on the payment pattern of the losses assumed and ranges between 9 and 40 years. The unamortized value is reviewed regularly to determine if it is recoverable based upon the terms of the contract, estimated losses and loss expenses, and anticipated investment income. Unrecoverable amounts are expensed in the period identified.

e) Investments
Fixed maturities, equity securities, and short-term investments
Fixed maturities are classified as either available for sale or held to maturity.

- Available for sale (AFS) portfolio is reported at fair value with changes in fair value recorded as a separate component of AOCI in Shareholders' equity.
- Held to maturity (HTM) portfolio includes securities for which we have the ability and intent to hold to maturity or redemption and is reported at amortized cost.

Equity securities are reported at fair value with changes in fair value recorded in net realized gains (losses) on the Consolidated statement of operations. Prior to January 1, 2018, changes in fair value were recorded as a separate component of AOCI in Shareholders' equity.

Short-term investments comprise securities due to mature within one year of the date of purchase and are recorded at fair value which typically approximates cost.

Interest, dividend income, and amortization of fixed maturity market premiums and discounts, related to these securities are recorded in Net investment income, net of investment management and custody fees, in the Consolidated statement of operations.

In addition, net investment income includes the amortization of the fair value adjustment related to the acquired invested assets of The Chubb Corporation (Chubb Corp). An adjustment of $1,652 million related to the fair value of Chubb Corp's fixed maturities securities was recorded (fair value adjustment) at the date of acquisition. At December 31, 2019, the remaining balance of this fair value adjustment was $332 million which is expected to amortize over the next three years; however, the estimate could vary materially based on current market conditions, bond calls, and the duration of the acquired investment portfolio. In addition, sales of these acquired fixed maturities would also reduce the fair value adjustment balance. For mortgage-backed securities and any other holdings for which there is a prepayment risk, prepayment assumptions are evaluated and revised as necessary. Any adjustments required due to the resultant change in effective yields and maturities are recognized prospectively. Prepayment fees or call premiums that are only payable when a security is called prior to its maturity are earned when received and reflected in Net investment income.

We regularly review our fixed maturities for other than temporary impairment (OTTI). Refer to Note 3 for additional information. With respect to fixed maturities where the decline in value is determined to be temporary and is not written down, a subsequent decision may be made to sell that security and realize a loss. Subsequent decisions on fixed maturities sales are the result of changing or unforeseen facts and circumstances (i.e., arising from a large insured loss such as a catastrophe), deterioration of the creditworthiness of the issuer or its industry, or changes in regulatory requirements. We believe that subsequent decisions to sell such securities are consistent with the classification of the majority of the portfolio as available for sale.

Other investments
Other investments principally comprise investment funds, limited partnerships, partially-owned investment companies, life insurance policies, policy loans, and non-qualified separate account assets.

Investment funds and limited partnerships
Investment funds, limited partnerships, and all other investments over which Chubb cannot exercise significant influence are accounted for as follows. Generally, we own less than three percent of the investee's shares.

- Income and expenses from these funds are reported within Net investment income.
- These funds are carried at net asset value, which approximates fair value with changes in fair value recorded in net realized gains (losses) on the Consolidated statement of operations. Refer to Note 4 for a further discussion on net asset value. Prior to January 1, 2018, changes in fair value were recorded as a separate component of AOCI in Shareholders' equity.
- As a result of the timing of the receipt of valuation data from the investment managers, these investments are generally reported on a three-month lag.
- Sales of these investments are reported within Net realized gains (losses).

Partially-owned investment companies

Partially-owned investment companies where our ownership interest is in excess of three percent are accounted for under the equity method because Chubb exerts significant influence. These investments apply investment company accounting to determine operating results, and Chubb retains the investment company accounting in applying the equity method.

- This means that investment income, realized gains or losses, and unrealized gains or losses are included in the portion of equity earnings reflected in Other (income) expense.
- As a result of the timing of the receipt of valuation data from the investment managers, these investments are generally reported on a three-month lag.

Other

- Policy loans are carried at outstanding balance and interest income is reflected in Net investment income.
- Life insurance policies are carried at policy cash surrender value and income is reflected in Other (income) expense.
- Non-qualified separate account assets are supported by assets that do not qualify for separate accounting reporting under GAAP. The underlying securities are recorded on a trade date basis and carried at fair value. Unrealized gains and losses on non-qualified separate account assets are reflected in Other (income) expense.

Investments in partially-owned insurance companies
Investments in partially-owned insurance companies primarily represent direct investments in which Chubb has significant influence and as such, meet the requirements for equity accounting. Generally, we own twenty percent or more of the investee's shares. We report our share of the net income or loss of the partially-owned insurance companies in Other (income) expense.

Derivative instruments
Chubb recognizes all derivatives at fair value in the Consolidated balance sheets in either Accounts payable, accrued expenses, and other liabilities or Other assets. Changes in fair value are included in Net realized gains (losses) in the Consolidated statements of operations. We did not designate any derivatives as accounting hedges. We participate in derivative instruments in two principal ways:

(i) To sell protection to customers as an insurance or reinsurance contract that meets the definition of a derivative for accounting purposes. The reinsurance of GLBs was our primary product falling into this category; and

(ii) To mitigate financial risks and manage certain investment portfolio risks and exposures, including assets and liabilities held in foreign currencies. We use derivative instruments including futures, options, swaps, and foreign currency forward contracts. Refer to Note 10 for additional information.

Securities lending program
Chubb participates in a securities lending program operated by a third-party banking institution whereby certain assets are loaned to qualified borrowers and from which we earn an incremental return which is recorded within Net investment income in the Consolidated statement of operations.

Borrowers provide collateral, in the form of either cash or approved securities, at a minimum of 102 percent of the fair value of the loaned securities. Each security loan is deemed to be an overnight transaction. Cash collateral is invested in a collateral pool which is managed by the banking institution. The collateral pool is subject to written investment guidelines with key objectives which include the safeguard of principal and adequate liquidity to meet anticipated redemptions. The fair value of the loaned securities is monitored on a daily basis, with additional collateral obtained or refunded as the fair value of the loaned securities changes. The collateral is held by the third-party banking institution, and the collateral can only be accessed in the event that the institution borrowing the securities is in default under the lending agreement. As a result of these restrictions, we consider our securities lending activities to be non-cash investing and financing activities. An indemnification agreement with the lending agent protects us in the event a borrower becomes insolvent or fails to return any of the securities on loan.

The fair value of the securities on loan is included in fixed maturities and equity securities in the Consolidated balance sheets. The securities lending collateral is reported as a separate line in the Consolidated balance sheets with a related liability reflecting our obligation to return the collateral plus interest.

Repurchase agreements
Similar to securities lending arrangements, securities sold under repurchase agreements, whereby Chubb sells securities and repurchases them at a future date for a predetermined price, are accounted for as collateralized investments and borrowings and are recorded at the contractual repurchase amounts plus accrued interest. Assets to be repurchased are the same or substantially the same as the assets transferred, and the transferor, through right of substitution, maintains the right and ability to redeem the collateral on short notice. The fair value of the underlying securities is included in fixed maturities and equity securities. In contrast to securities lending programs, the use of cash received is not restricted. We report the obligation to return the cash as Repurchase agreements in the Consolidated balance sheets and record the fees under these repurchase agreements within Interest expense on the Consolidated statement of operations.

Refer to Note 4 for a discussion on the determination of fair value for Chubb's various investment securities.

f) Cash
Cash includes cash on hand and deposits with an original maturity of three months or less at time of purchase.

We have agreements with a third-party bank provider which implemented two international multi-currency notional cash pooling programs. In each program, participating Chubb entities establish deposit accounts in different currencies with the bank provider and each day the credit or debit balances in every account are notionally translated into a single currency (U.S. dollars) and then notionally pooled. The bank extends overdraft credit to any participating Chubb entity as needed, provided that the overall notionally-pooled balance of all accounts in each pool at the end of each day is at least zero. Actual cash balances are not physically converted and are not commingled between legal entities. Any overdraft balances incurred under this program by a Chubb entity would be guaranteed by Chubb Limited (up to $300 million in the aggregate). Our syndicated letter of credit facility allows for same day drawings to fund a net pool overdraft should participating Chubb entities overdraw contributed funds from the pool.

Restricted cash
Restricted cash in the Consolidated balance sheets represents amounts held for the benefit of third parties and is legally or contractually restricted as to withdrawal or usage. Amounts include deposits with U.S. and non-U.S. regulatory authorities, trust funds set up for the benefit of ceding companies, and amounts pledged as collateral to meet financing arrangements.

Effective January 1, 2018, we retrospectively adopted guidance on "Restricted Cash" that clarified the presentation of restricted cash on the Consolidated statement of cash flows. As a result, we revised the Consolidated statement of cash flows for the year ended December 31, 2017 to include restricted cash in the beginning and ending cash balances.

The following table provides a reconciliation of cash and restricted cash reported within the Consolidated balance sheets that total to the amounts shown in the Consolidated statements of cash flows:

(in millions of U.S. dollars)			December 31
	2019	2018	2017
Cash	**$ 1,537**	$ 1,247	$ 728
Restricted cash	**109**	93	123
Total cash and restricted cash shown in the Consolidated statements of cash flows	**$ 1,646**	$ 1,340	$ 851

g) Goodwill and Other intangible assets
Goodwill represents the excess of the cost of acquisitions over the fair value of net assets acquired and is not amortized. Goodwill is assigned at acquisition to the applicable reporting unit of the acquired entities giving rise to the goodwill. Goodwill impairment tests are performed annually or more frequently if circumstances indicate a possible impairment. For goodwill impairment testing, we use a qualitative assessment to determine whether it is more likely than not (i.e., more than a 50 percent probability) that the fair value of a reporting unit is greater than its carrying amount. If our assessment indicates less than a 50 percent probability that fair value exceeds carrying value, we quantitatively estimate a reporting unit's fair value. Goodwill recorded in connection with investments in partially-owned insurance companies is recorded in Investments in partially-owned insurance companies and is also measured for impairment annually.

Indefinite lived intangible assets are not subject to amortization. Finite lived intangible assets are amortized over their useful lives, generally ranging from 1 to 25 years. Intangible assets are regularly reviewed for indicators of impairment. Impairment is recognized if the carrying amount is not recoverable from its undiscounted cash flows and is measured as the difference between the carrying amount and fair value.

h) Unpaid losses and loss expenses
A liability is established for the estimated unpaid losses and loss expenses under the terms of, and with respect to, Chubb's policies and agreements. Similar to premiums that are recognized as revenues over the coverage period of the policy, a liability for unpaid losses and loss expenses is recognized as expense when insured events occur over the coverage period of the policy. This liability includes a provision for both reported claims (case reserves) and incurred but not reported claims (IBNR reserves). IBNR reserve estimates are generally calculated by first projecting the ultimate cost of all losses that have occurred (expected losses), and then subtracting paid losses, case reserves, and loss expenses. The methods of determining such estimates and establishing the resulting liability are reviewed regularly and any adjustments are reflected in operations in the period in which they become known. Future developments may result in losses and loss expenses materially greater or less than recorded amounts.

Except for net loss and loss expense reserves of $31 million, net of discount, held at December 31, 2019, representing certain structured settlements for which the timing and amount of future claim payments are reliably determinable and $43 million, net of discount, of certain reserves for unsettled claims, Chubb does not discount its P&C loss reserves. This compares with reserves of $33 million for certain structured settlements and $40 million of certain reserves for unsettled claims at December 31, 2018. Structured settlements represent contracts purchased from life insurance companies primarily to settle workers' compensation claims, where payments to the claimant by the life insurance company are expected to be made in the form of an annuity. Chubb retains the liability to the claimant in the event that the life insurance company fails to pay. At December 31, 2019, the liability due to claimants was $567 million, net of discount, and reinsurance recoverables due from the life insurance companies was $536 million, net of discount. For structured settlement contracts where payments are guaranteed regardless of claimant life expectancy, the amounts recoverable from the life insurance companies at December 31, 2019 are included in Other assets in the Consolidated balance sheets, as they do not meet the requirements for reinsurance accounting.

Included in Unpaid losses and loss expenses are liabilities for asbestos and environmental (A&E) claims and expenses. These unpaid losses and loss expenses are principally related to claims arising from remediation costs associated with hazardous waste sites and bodily-injury claims related to asbestos products and environmental hazards. The estimation of these liabilities is particularly sensitive to changes in the legal environment including specific settlements that may be used as precedents to settle future claims. However, Chubb does not anticipate future changes in laws and regulations in setting its A&E reserve levels.

Also included in Unpaid losses and loss expenses is the fair value adjustment of $145 million and $207 million at December 31, 2019 and December 31, 2018, respectively, related to Chubb Corp's historical unpaid losses and loss expenses. The estimated fair value consists of the present value of the expected net unpaid loss and loss adjustment expense payments adjusted for an estimated risk margin. The estimated cash flows are discounted at a risk free rate. The estimated risk margin varies based on the inherent risks associated with each type of reserve. The fair value is amortized through Amortization of purchased intangibles on the consolidated statements of operations through the year 2032, based on the estimated payout patterns of unpaid loss and loss expenses at the acquisition date.

Our loss reserves are presented net of contractual deductible recoverable amounts due from policyholders. Under the terms of certain high deductible policies which we offer, such as workers' compensation and general liability, our customers are responsible to reimburse us for an agreed-upon dollar amount per claim. In nearly all cases we are required under such policies to pay covered claims first, and then seek reimbursement for amounts within the applicable deductible from our customers. We generally seek to mitigate this risk through collateral agreements.

Prior period development arises from changes to loss estimates recognized in the current year that relate to loss reserves first reported in previous calendar years and excludes the effect of losses from the development of earned premiums from previous accident years.

For purposes of analysis and disclosure, management views prior period development to be changes in the nominal value of loss estimates from period to period, net of premium and profit commission adjustments on loss sensitive contracts. Prior period development generally excludes changes in loss estimates that do not arise from the emergence of claims, such as those related to uncollectible reinsurance, interest, unallocated loss adjustment expenses, or foreign currency. Accordingly, specific items excluded from prior period development include the following: gains/losses related to foreign currency remeasurement; losses recognized from the early termination or commutation of reinsurance agreements that principally relate to the time value of money; changes in the value of reinsurance business assumed reflected in losses incurred but principally related to the time value of money; and losses that arise from changes in estimates of earned premiums from prior accident years. Except for foreign currency remeasurement, which is included in Net realized gains (losses), these items are included in current year losses.

i) Future policy benefits
The valuation of long-duration contract reserves requires management to make estimates and assumptions regarding expenses, mortality, persistency, and investment yields. Estimates are primarily based on historical experience and information provided by ceding companies and include a margin for adverse deviation. Interest rates used in calculating reserves range from less than 1.0 percent to 11.0 percent at both December 31, 2019 and 2018. Actual results could differ materially from these estimates. Management monitors actual experience and where circumstances warrant, will revise assumptions and the related reserve estimates. Revisions are recorded in the period they are determined.

Certain of our long-duration contracts are supported by assets that do not qualify for separate account reporting under GAAP. These assets are classified as non-qualified separate account assets and reported in Other investments and the offsetting liabilities are reported in Future policy benefits in the Consolidated balance sheets. Changes in the fair value of separate account assets that do not qualify for separate account reporting under GAAP are reported in Other income (expense) and the offsetting movements in the liabilities are included in Policy benefits in the Consolidated statements of operations.

j) Assumed reinsurance programs involving minimum benefit guarantees under variable annuity contracts
Chubb reinsures various death and living benefit guarantees associated with variable annuities issued primarily in the United States. We generally receive a monthly premium during the accumulation phase of the covered annuities (in-force) based on a percentage of either the underlying accumulated account values or the underlying accumulated guaranteed values. Depending on an annuitant's age, the accumulation phase can last many years. To limit our exposure under these programs, all reinsurance treaties include annual or aggregate claim limits and many include an aggregate deductible.

The guarantees which are payable on death, referred to as guaranteed minimum death benefits (GMDB), principally cover shortfalls between accumulated account value at the time of an annuitant's death and either i) an annuitant's total deposits; ii) an annuitant's total deposits plus a minimum annual return; or iii) the highest accumulated account value attained at any policy anniversary date. In addition, a death benefit may be based on a formula specified in the variable annuity contract that uses a percentage of the growth of the underlying contract value. Liabilities for GMDBs are based on cumulative assessments or premiums to date multiplied by a benefit ratio that is determined by estimating the present value of benefit payments and related adjustment expenses divided by the present value of cumulative assessment or expected premiums during the contract period.

Under reinsurance programs covering GLBs, we assume the risk of guaranteed minimum income benefits (GMIB) associated with variable annuity contracts. The GMIB risk is triggered if, at the time the contract holder elects to convert the accumulated account value to a periodic payment stream (annuitize), the accumulated account value is not sufficient to provide a guaranteed minimum level of monthly income. We also assume the risk of guaranteed minimum accumulation benefits (GMAB). However, at December 31, 2019, the risks related to our GMAB programs are minimal given that the majority of these policies are no longer in force. Our GLB reinsurance products meet the definition of a derivative for accounting purposes and are carried at fair value with changes in fair value recognized in Realized gains (losses) in the Consolidated statement of operations. Refer to Notes 5 c) and 10 a) for additional information.

k) Deposit assets and liabilities
Deposit assets arise from ceded reinsurance contracts purchased that do not transfer significant underwriting or timing risk. Deposit liabilities include reinsurance deposit liabilities and contract holder deposit funds. The reinsurance deposit liabilities arise from contracts sold for which there is not a significant transfer of risk. Contract holder deposit funds represent a liability for investment contracts sold that do not meet the definition of an insurance contract, and certain of these contracts are sold with a guaranteed rate of return. Under deposit accounting, consideration received or paid is recorded as a deposit asset or liability in the balance sheet as opposed to recording premiums and losses in the statement of operations.

Interest income on deposit assets, representing the consideration received or to be received in excess of cash payments related to the deposit contract, is earned based on an effective yield calculation. The calculation of the effective yield is based on the amount and timing of actual cash flows at the balance sheet date and the estimated amount and timing of future cash flows. The effective yield is recalculated periodically to reflect revised estimates of cash flows. When a change in the actual or estimated cash flows occurs, the resulting change to the carrying amount of the deposit asset is reported as income or expense. Deposit assets of $93 million and $97 million at December 31, 2019 and 2018, respectively, are reflected in Other assets in the Consolidated balance sheets and the accretion of deposit assets related to interest pursuant to the effective yield calculation is reflected in Net investment income in the Consolidated statements of operations.

Deposit liabilities include reinsurance deposit liabilities of $88 million and $97 million and contract holder deposit funds of $2.0 billion and $1.8 billion at December 31, 2019 and 2018, respectively. Deposit liabilities are reflected in Accounts payable, accrued expenses, and other liabilities in the Consolidated balance sheets. At contract inception, the deposit liability equals net cash received. An accretion rate is established based on actuarial estimates whereby the deposit liability is increased to the estimated amount payable over the contract term. The deposit accretion rate is the rate of return required to fund expected future payment obligations. We periodically reassess the estimated ultimate liability and related expected rate of return. Changes to the deposit liability are generally reflected through Interest expense to reflect the cumulative effect of the period the contract has been in force, and by an adjustment to the future accretion rate of the liability over the remaining estimated contract term.

The liability for contract holder deposit funds equals accumulated policy account values, which consist of the deposit payments plus credited interest less withdrawals and amounts assessed through the end of the period.

l) Property and Equipment
Property and equipment used in operations are capitalized and carried at cost less accumulated depreciation and are reported within Other assets in the Consolidated balance sheets. At December 31, 2019, property and equipment totaled $1.9 billion, consisting principally of capitalized software costs of $1.1 billion incurred to develop or obtain computer software for internal use and company-owned facilities of $270 million. Depreciation is calculated using the straight-line method over the estimated useful lives of the assets. For capitalized software, the estimated useful life is generally three to five years, but can be as long as 15 years and for company-owned facilities the estimated useful life is 40 years. At December 31, 2018, property and equipment totaled $1.7 billion.

m) Foreign currency remeasurement and translation
The functional currency for each of our foreign operations is generally the currency of the local operating environment. Transactions in currencies other than a foreign operation's functional currency are remeasured into the functional currency, and the resulting foreign exchange gains and losses are reflected in Net realized gains (losses) in the Consolidated statements of operations. Functional currency assets and liabilities are translated into the reporting currency, U.S. dollars, using period end exchange rates and the related translation adjustments are recorded as a separate component of AOCI in Shareholders' equity. Functional statement of operations amounts expressed in functional currencies are translated using average exchange rates.

n) Administrative expenses
Administrative expenses generally include all operating costs other than policy acquisition costs. The North America Commercial P&C Insurance segment manages and uses an in-house third-party claims administrator, ESIS Inc. (ESIS). ESIS performs claims management and risk control services for domestic and international organizations that self-insure P&C exposures as well as internal P&C exposures. The net operating income of ESIS is included within Administrative expenses in the Consolidated statements of operations and were $47 million, $49 million, and $38 million for the years ended December 31, 2019, 2018, and 2017, respectively.

o) Income taxes
Income taxes have been recorded related to those operations subject to income tax. Deferred tax assets and liabilities result from temporary differences between the amounts recorded in the consolidated financial statements and the tax basis of our assets and liabilities. The effect on deferred tax assets and liabilities of a change in tax law or rates is recognized in the period that includes the enactment date. A valuation allowance against deferred tax assets is recorded if it is more likely than not that all, or some portion, of the benefits related to these deferred tax assets will not be realized. The valuation allowance assessment considers tax planning strategies, where appropriate.

We recognize uncertain tax positions deemed more likely than not of being sustained upon examination. Recognized income tax positions are measured at the largest amount that has a greater than 50 percent likelihood of being realized. Changes in recognition or measurement are reflected in the period in which the change in judgment occurs.

p) Earnings per share
Basic earnings per share is calculated using the weighted-average shares outstanding, including participating securities with non-forfeitable rights to dividends such as unvested restricted stock. All potentially dilutive securities, including stock options are excluded from the basic earnings per share calculation. In calculating diluted earnings per share, the weighted-average

shares outstanding is increased to include all potentially dilutive securities. Basic and diluted earnings per share are calculated by dividing net income by the applicable weighted-average number of shares outstanding during the year.

q) Cash flow information
Premiums received and losses paid associated with the GLB reinsurance products, which as discussed previously, meet the definition of a derivative instrument for accounting purposes, are included within Cash flows from operating activities. Cash flows, such as settlements and collateral requirements, associated with GLB and all other derivative instruments, are included on a net basis within Cash flows from investing activities. Purchases, sales, and maturities of short-term investments are recorded on a net basis within Cash flows from investing activities.

r) Share-based compensation
Chubb measures and records compensation cost for all share-based payment awards at grant-date fair value. Compensation costs are recognized for vesting of share-based payment awards with only service conditions on a straight-line basis over the requisite service period for each separately vesting portion of the award as if the award were, in substance, multiple awards. For retirement-eligible participants, compensation costs for certain share-based payment awards are recognized immediately at the date of grant. Refer to Note 12 for additional information.

s) Chubb integration expenses
Direct costs related to the Chubb Corp acquisition were expensed as incurred. Chubb integration expenses were $23 million, $59 million, and $310 million for the years ended December 31, 2019, 2018 and 2017, respectively, and include all internal and external costs directly related to the integration activities of the Chubb Corp acquisition. These expenses principally consisted of personnel-related expenses, consulting fees, and rebranding.

t) New accounting pronouncements
Adopted in 2019
Premium Amortization on Purchased Callable Debt Securities
Effective January 1, 2019, we adopted new guidance on accounting for premium amortization on purchased callable debt securities for bonds held at a premium on a modified retrospective basis. The guidance requires the premium to be amortized to the earliest call date. As a result, we recorded a cumulative effect adjustment to decrease beginning retained earnings by $12 million after-tax ($15 million pre-tax). Securities held at a discount did not require an accounting change.

Lease Accounting
Effective January 1, 2019, we adopted new lease accounting guidance and elected to utilize a modified retrospective approach which allowed us to initially apply the new lease standard at the adoption date and recognize a cumulative effect adjustment to the opening balance of retained earnings for 2019, with no adjustment to prior periods presented. The cumulative effect adjustment to the opening balance of retained earnings was zero. Our leases consist principally of real estate operating leases that are amortized on a straight-line basis over the term of the lease. The adoption of the updated guidance resulted in recognizing a right-of-use asset, which was recorded within Other assets, and a lease liability, which was recorded within Accounts payable, accrued expenses, and other liabilities on the Consolidated balance sheet as well as de-recognizing the liability for deferred rent that was required under the previous guidance. The adoption of the new guidance did not have a material effect on our results of operations, financial condition or liquidity. Refer to Note 10 i) for additional information on leases.

Changes to the Disclosure Requirements for Fair Value Measurement
In August 2018, the FASB issued amendments to modify the disclosure requirements on fair value measurements. The amendments allow for the removal of: (i) the amount and reasons for transfer between Level 1 and Level 2 of the fair value hierarchy; (ii) the policy for timing of transfers between levels; and (iii) the valuation processes for Level 3 fair value measurements. This update also requires additional disclosure including an expanded discussion on unobservable inputs that are significant to the fair value measurement. We early adopted the amendments that allow the removal of certain disclosures in 2018 and added the expanded discussion on unobservable inputs in the fourth quarter of 2019, as permitted. The guidance changes disclosure only and did not have an impact on our financial condition or results of operations.

Adopted in 2020
Financial Instruments – Credit Losses: Measurement of Credit Losses on Financial Instruments
Effective January 1, 2020, we adopted, on a modified retrospective basis, new guidance on the accounting for credit losses of financial instruments that are measured at amortized cost, including held to maturity securities, reinsurance recoverables, and high deductible receivables, by applying an approach based on the current expected credit losses (CECL). The estimate of

expected credit losses considers historical information, current information, as well as reasonable and supportable forecasts, including estimates of prepayments. In addition, the guidance also amended the current available for sale (AFS) debt security other-than-temporary impairment model by requiring an estimate of the expected credit loss (ECL) only when the fair value is below the amortized cost of the asset. The length of time the fair value of an AFS security has been below the amortized cost no longer impacts the determination of whether a potential credit loss exists. The AFS security model also requires the use of a valuation allowance as compared to the current practice of writing down the asset.

During the first quarter of 2020, we established a valuation allowance for credit losses and recognized a cumulative effect adjustment and decreased beginning retained earnings by approximately $70 million pre-tax, or $64 million after-tax.

Accounting guidance not yet adopted
Targeted Improvements to the Accounting for Long-Duration Contracts
In August 2018, the FASB issued guidance to improve the existing recognition, measurement, presentation, and disclosure requirements for long-duration contracts issued by an insurance entity. The amendments in this update require more frequent updating of assumptions and a standardized discount rate for the future policy benefit liability, a requirement to use the fair value measurement model for policies with market risk benefits, simplified amortization of deferred acquisition costs, and enhanced disclosures. This standard will be effective for us in the first quarter of 2022 with early adoption permitted. We are currently assessing the effect of adopting this guidance on our financial condition and results of operations. We will be better able to quantify the effect of adopting this standard as we progress in our implementation process and draw nearer to the date of adoption.

Income Taxes - Simplifying the Accounting for Income Taxes
In December 2019, the FASB issued updated guidance for the accounting for income taxes. The updated guidance is intended to simplify the accounting for income taxes by removing several exceptions contained in existing guidance and amending other existing guidance to simplify several other income tax accounting matters. The updated guidance is effective for us in the first quarter of 2021 with early adoption permitted. We are currently evaluating the impact of this guidance on our financial condition and results of operations; however, it is not expected to have a material impact at the date of adoption.

2. **Acquisitions**

Huatai Group

Chubb maintains a direct investment in Huatai Insurance Group Company Limited (Huatai Group). Huatai Group is the parent company of, and owns 100 percent of, Huatai Property & Casualty Insurance Co., Ltd. (Huatai P&C) and approximately 80 percent of Huatai Life Insurance Co., Ltd. (Huatai Life). Huatai Group's insurance operations have more than 600 branches and 11 million customers in China. In 2019, Chubb increased its aggregate ownership interest in Huatai Group from 20 percent to 30.9 percent, with purchases of 6.2 percent for approximately $329 million in May 2019 and 4.7 percent for approximately $251 million in December 2019. Chubb continues to apply the equity method of accounting to its investment in Huatai Group by recording its share of net income or loss in Other (income) expense in the Consolidated statements of operations. Refer to Note 14 for additional information. The Consolidated statements of operations include the equity income from the additional ownership interests as of each respective closing date.

During 2019, Chubb also entered into agreements to acquire an additional 22.4 percent ownership in Huatai Group for approximately $1.6 billion through two separate purchases, a 15.3 percent ownership interest for approximately $1.1 billion and a 7.1 percent ownership interest for approximately $493 million. These purchases are contingent upon Chinese insurance regulatory approval and other important conditions that are expected to be completed by the end of 2021. The purchase of the 7.1 percent ownership stake is also contingent upon the receipt of Chinese insurance regulatory approval of the 15.3 percent purchase.

Upon completion of the 7.1 percent purchase, which will result in majority ownership of Huatai Group at 53.3 percent, Chubb is expected to obtain control of Huatai Group, Huatai P&C and Huatai Life. At that time, Chubb is expected to apply consolidation accounting and discontinue the application of the equity method of accounting.

Banchile Seguros de Vida

On December 30, 2019, we acquired Banchile Seguros de Vida, an insurance company providing both life and property and casualty coverages in Chile, for approximately $80 million in cash. The consolidated financial statements will include results of this acquisition within the Chubb Overseas General and Life Insurance segment results.

3. Investments

a) Fixed maturities

December 31, 2019 (in millions of U.S. dollars)	Amortized Cost	Gross Unrealized Appreciation	Gross Unrealized Depreciation	Fair Value	OTTI Recognized in AOCI
Available for sale					
U.S. Treasury and agency	$ 3,188	$ 96	$ (1)	$ 3,283	$ —
Foreign	22,670	1,099	(62)	23,707	(25)
Corporate securities	30,689	1,180	(78)	31,791	(5)
Mortgage-backed securities	18,712	494	(14)	19,192	—
States, municipalities, and political subdivisions	7,321	205	(11)	7,515	—
	$ 82,580	$ 3,074	$ (166)	$ 85,488	$ (30)
Held to maturity					
U.S. Treasury and agency	$ 1,318	$ 29	$ —	$ 1,347	$ —
Foreign	1,423	62	—	1,485	—
Corporate securities	2,349	121	(2)	2,468	—
Mortgage-backed securities	2,331	65	—	2,396	—
States, municipalities, and political subdivisions	5,160	150	(1)	5,309	—
	$ 12,581	$ 427	$ (3)	$ 13,005	$ —

December 31, 2018 (in millions of U.S. dollars)	Amortized Cost	Gross Unrealized Appreciation	Gross Unrealized Depreciation	Fair Value	OTTI Recognized in AOCI
Available for sale					
U.S. Treasury and agency	$ 4,158	$ 30	$ (43)	$ 4,145	$ —
Foreign	21,370	395	(349)	21,416	—
Corporate securities	27,183	150	(750)	26,583	(6)
Mortgage-backed securities	15,758	66	(284)	15,540	(1)
States, municipalities, and political subdivisions	10,854	49	(117)	10,786	—
	$ 79,323	$ 690	$ (1,543)	$ 78,470	$ (7)
Held to maturity					
U.S. Treasury and agency	$ 1,185	$ 8	$ (11)	$ 1,182	$ —
Foreign	1,549	11	(18)	1,542	—
Corporate securities	2,601	11	(104)	2,508	—
Mortgage-backed securities	2,524	5	(43)	2,486	—
States, municipalities, and political subdivisions	5,576	16	(51)	5,541	—
	$ 13,435	$ 51	$ (227)	$ 13,259	$ —

As discussed in Note 3 c), if a credit loss is incurred on an impaired fixed maturity, an OTTI is considered to have occurred and the portion of the impairment not related to credit losses (non-credit OTTI) is recognized in OCI. Included in the "OTTI Recognized in AOCI" columns above are the cumulative amounts of non-credit OTTI recognized in OCI adjusted for subsequent sales, maturities, and redemptions. OTTI recognized in AOCI does not include the impact of subsequent changes in fair value of the related securities. In periods subsequent to a recognition of OTTI in OCI, changes in the fair value of the related fixed maturities are reflected in Net unrealized appreciation on investments in the Consolidated statements of shareholders' equity. For the years ended December 31, 2019 and 2018, $3 million of net unrealized appreciation and $4 million of net unrealized depreciation, respectively, related to such securities are included in OCI. At December 31, 2019 and 2018, AOCI included cumulative net unrealized depreciation of $18 million and net unrealized appreciation of $1 million, respectively, related to securities remaining in the investment portfolio for which a non-credit OTTI was recognized.

Mortgage-backed securities (MBS) issued by U.S. government agencies are combined with all other to be announced mortgage-backed securities held (refer to Note 10 b) (iv)) and are included in the category, “Mortgage-backed securities”. Approximately 83 percent and 81 percent of the total mortgage-backed securities at December 31, 2019 and 2018, respectively, are represented by investments in U.S. government agency bonds. The remainder of the mortgage exposure consists of collateralized mortgage obligations and non-government mortgage-backed securities, the majority of which provide a planned structure for principal and interest payments and carry a rating of AAA by the major credit rating agencies.

The following table presents fixed maturities by contractual maturity:

		December 31 2019		December 31 2018
(in millions of U.S. dollars)	**Amortized Cost**	**Fair Value**	Amortized Cost	Fair Value
Available for sale				
Due in 1 year or less	**$ 3,951**	**$ 3,973**	$ 3,569	$ 3,568
Due after 1 year through 5 years	**27,142**	**27,720**	27,134	27,005
Due after 5 years through 10 years	**23,901**	**24,874**	24,095	23,543
Due after 10 years	**8,874**	**9,729**	8,767	8,814
	63,868	**66,296**	63,565	62,930
Mortgage-backed securities	**18,712**	**19,192**	15,758	15,540
	$ 82,580	**$ 85,488**	$ 79,323	$ 78,470
Held to maturity				
Due in 1 year or less	**$ 478**	**$ 479**	$ 536	$ 537
Due after 1 year through 5 years	**3,869**	**3,940**	3,122	3,106
Due after 5 years through 10 years	**3,756**	**3,883**	4,468	4,407
Due after 10 years	**2,147**	**2,307**	2,785	2,723
	10,250	**10,609**	10,911	10,773
Mortgage-backed securities	**2,331**	**2,396**	2,524	2,486
	$ 12,581	**$ 13,005**	$ 13,435	$ 13,259

Expected maturities could differ from contractual maturities because borrowers may have the right to call or prepay obligations, with or without call or prepayment penalties.

b) Gross unrealized loss
At December 31, 2019, there were 4,091 fixed maturities out of a total of 31,203 fixed maturities in an unrealized loss position. The largest single unrealized loss in the fixed maturities was $6 million. Fixed maturities in an unrealized loss position at December 31, 2019, comprised both investment grade and below investment grade securities for which fair value declined primarily due to widening credit spreads since the date of purchase.

The following tables present, for all securities in an unrealized loss position (including securities on loan), the aggregate fair value and gross unrealized loss by length of time the security has continuously been in an unrealized loss position:

December 31, 2019 (in millions of U.S. dollars)	0 – 12 Months Fair Value	0 – 12 Months Gross Unrealized Loss	Over 12 Months Fair Value	Over 12 Months Gross Unrealized Loss	Total Fair Value	Total Gross Unrealized Loss
U.S. Treasury and agency	$ 234	$ (1)	$ 339	$ —	$ 573	$ (1)
Foreign	1,846	(34)	802	(28)	2,648	(62)
Corporate securities	2,121	(40)	988	(40)	3,109	(80)
Mortgage-backed securities	1,174	(6)	932	(8)	2,106	(14)
States, municipalities, and political subdivisions	188	—	276	(12)	464	(12)
Total fixed maturities	$ 5,563	$ (81)	$ 3,337	$ (88)	$ 8,900	$ (169)

December 31, 2018 (in millions of U.S. dollars)	0 – 12 Months Fair Value	0 – 12 Months Gross Unrealized Loss	Over 12 Months Fair Value	Over 12 Months Gross Unrealized Loss	Total Fair Value	Total Gross Unrealized Loss
U.S. Treasury and agency	$ 523	$ (4)	$ 2,859	$ (50)	$ 3,382	$ (54)
Foreign	6,764	(208)	5,349	(159)	12,113	(367)
Corporate securities	16,538	(599)	4,873	(255)	21,411	(854)
Mortgage-backed securities	6,103	(98)	6,913	(229)	13,016	(327)
States, municipalities, and political subdivisions	5,024	(44)	7,768	(124)	12,792	(168)
Total fixed maturities	$ 34,952	$ (953)	$ 27,762	$ (817)	$ 62,714	$ (1,770)

c) Net realized gains (losses)

OTTI related to fixed maturities
In accordance with guidance related to the recognition and presentation of OTTI, when an impairment related to a fixed maturity has occurred, OTTI is required to be recorded in Net income if management has the intent to sell the security or it is more likely than not that we will be required to sell the security before the recovery of its amortized cost. Further, in cases where we do not intend to sell the security and it is more likely than not that we will not be required to sell the security, we must evaluate the security to determine the portion of the impairment, if any, related to credit losses. If a credit loss is incurred, an OTTI is considered to have occurred and any portion of the OTTI related to credit losses must be reflected in Net income while the portion of OTTI related to all other factors is recognized in OCI. For fixed maturities held to maturity, OTTI recognized in OCI is accreted from AOCI to the amortized cost of the fixed maturity prospectively over the remaining term of the securities. Each quarter, securities in an unrealized loss position (impaired securities), including fixed maturities and securities lending collateral are reviewed to identify impaired securities to be specifically evaluated for a potential OTTI.

Evaluation of potential credit losses related to fixed maturities
We review each fixed maturity in an unrealized loss position to assess whether the security is a candidate for credit loss. Specifically, we consider credit rating, market price, and issuer-specific financial information, among other factors, to assess the likelihood of collection of all principal and interest as contractually due. Securities, for which we determine that credit loss is likely, are subjected to further analysis to estimate the credit loss recognized in Net income, if any. In general, credit loss recognized in Net income equals the difference between the security's amortized cost and the net present value of its projected future cash flows discounted at the effective interest rate implicit in the debt security. All significant assumptions used in determining credit losses are subject to change as market conditions evolve.

U.S. Treasury and agency obligations (including agency mortgage-backed securities); foreign government obligations; and states, municipalities, and political subdivisions obligations
U.S. Treasury and agency obligations (including agency mortgage-backed securities); foreign government obligations; and states, municipalities, and political subdivisions obligations represent $61 million of gross unrealized loss at December 31, 2019. These securities were evaluated for credit loss primarily using qualitative assessments of the likelihood of credit loss considering credit rating of the issuers and level of credit enhancement, if any. We concluded that the high level of creditworthiness of the issuers coupled with credit enhancement, where applicable, supports recognizing no credit loss in Net income.

Corporate and foreign securities
Projected cash flows for corporate and foreign securities (principally senior unsecured bonds) are driven primarily by assumptions regarding probability of default and the timing and amount of recoveries associated with defaults. Chubb developed projected cash flows for corporate and foreign securities using market observable data, issuer-specific information, and credit ratings. We use historical default data by Moody's Investors Service (Moody's) rating category to calculate a 1-in-100 year probability of default, which results in a default assumption in excess of the historical mean default rate. Consistent with management's approach, Chubb assumed a 32 percent recovery rate (the par value of a defaulted security that will be recovered) across all rating categories, rather than using Moody's historical mean recovery rate of 42 percent. We believe that use of a default assumption, in excess of the historical mean is conservative. The following table presents default assumptions by Moody's rating category (historical mean default rate provided for comparison):

	Investment Grade	Below Investment Grade		
	Aaa-Baa	Ba	B	Caa-C
1-in-100 Year Default Rate	0.0 - 1.3%	4.8%	12.0%	36.3%
Historical Mean Default Rate	0.0 - 0.3%	1.0%	3.1%	10.4%

Application of the methodology and assumptions described above resulted in pre-tax credit losses recognized in Net income for corporate and foreign securities of $37 million, $25 million, and $5 million for the years ended December 31, 2019, 2018, and 2017, respectively.

Mortgage-backed securities
For mortgage-backed securities, credit impairment is assessed using a cash flow model that estimates the cash flows on the underlying mortgages, using the security-specific collateral and transaction structure. The model estimates cash flows from the underlying mortgage loans and distributes those cash flows to various tranches of securities, considering the transaction structure and any subordination and credit enhancements that exist in that structure. The cash flow model incorporates actual cash flows on the mortgage-backed securities through the current period and then projects the remaining cash flows using a number of assumptions, including default rates, prepayment rates, and loss severity rates (the par value of a defaulted security that will not be recovered) on foreclosed properties.

We develop specific assumptions using market data, where available, and include internal estimates as well as estimates published by rating agencies and other third-party sources. We project default rates by mortgage sector considering current underlying mortgage loan performance, generally assuming lower loss severity for Prime sector bonds versus ALT-A and Sub-prime bonds.

These estimates are extrapolated along a default timing curve to estimate the total lifetime pool default rate. Other assumptions used contemplate the actual collateral attributes, including geographic concentrations, rating agency loss projections, rating actions, and current market prices. If cash flow projections indicate that losses will exceed the credit enhancement for a given tranche, then we do not expect to recover our amortized cost basis, and we recognize an estimated credit loss in Net income.

For the years ended December 31, 2019, 2018, and 2017 there were no credit losses recognized in Net income for mortgage-backed securities.

The following table presents a roll-forward of pre-tax credit losses related to fixed maturities for which a portion of OTTI was recognized in OCI:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Balance of credit losses related to securities still held – beginning of year	**$ 34**	$ 22	$ 35
Additions where no OTTI was previously recorded	**33**	20	4
Additions where an OTTI was previously recorded	**4**	5	2
Reductions for securities sold during the period	**(41)**	(13)	(19)
Balance of credit losses related to securities still held – end of year	**$ 30**	$ 34	$ 22

The following table presents the components of Net realized gains (losses) and the change in net unrealized appreciation (depreciation) of investments:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Fixed maturities:			
OTTI on fixed maturities, gross	**$ (90)**	$ (52)	$ (24)
OTTI on fixed maturities recognized in OCI (pre-tax)	**32**	3	1
OTTI on fixed maturities, net	**(58)**	(49)	(23)
Gross realized gains excluding OTTI	**203**	334	149
Gross realized losses excluding OTTI	**(176)**	(587)	(157)
Total fixed maturities	**(31)**	(302)	(31)
Equity securities (1)	**104**	(59)	16
OTTI on other investments	**—**	—	(12)
Other investments	**(20)**	(5)	—
Foreign exchange gains	**7**	131	36
Investment and embedded derivative instruments	**(435)**	(75)	(11)
Fair value adjustments on insurance derivative	**(4)**	(248)	364
S&P futures	**(138)**	(4)	(261)
Other derivative instruments	**(8)**	(3)	(5)
Other	**(5)**	(87)	(12)
Net realized gains (losses) (pre-tax)	**$ (530)**	$ (652)	$ 84
Change in net unrealized appreciation (depreciation) on investments (pre-tax):			
Fixed maturities available for sale	**$ 3,769**	$ (1,958)	$ 519
Fixed maturities held to maturity	**(31)**	(38)	18
Equity securities	**—**	—	88
Other	**(3)**	—	8
Income tax (expense) benefit	**(647)**	297	(241)
Change in net unrealized appreciation (depreciation) on investments (after-tax)	**$ 3,088**	$ (1,699)	$ 392

(1) 2017 included gross realized gains of $28 million and gross realized losses of $2 million on sales, and OTTI of $10 million.

Realized gains and losses from Equity securities and Other investments from the table above include sales of securities and unrealized gains and losses from fair value changes as follows:

	Year Ended December 31, 2019			Year Ended December 31, 2018		
(in millions of U.S. dollars)	**Equity Securities**	**Other Investments**	**Total**	Equity Securities	Other Investments	Total
Net gains (losses) recognized during the period	**$ 104**	**$ (20)**	**$ 84**	$ (59)	$ (5)	$ (64)
Less: Net gains (losses) recognized from sales of securities	**58**	**(5)**	**53**	70	121	191
Unrealized gains (losses) recognized for securities still held at reporting date	**$ 46**	**$ (15)**	**$ 31**	$ (129)	$ (126)	$ (255)

d) Other investments

		December 31
(in millions of U.S. dollars)	**2019**	2018
Alternative investments:		
Partially-owned investment companies	**$ 4,142**	$ 3,623
Limited partnerships	**508**	538
Investment funds	**271**	83
Alternative investments	**4,921**	4,244
Life insurance policies	**377**	304
Policy loans	**247**	243
Non-qualified separate account assets [(1)]	**283**	252
Other	**234**	234
Total	**$ 6,062**	$ 5,277

(1) Non-qualified separate account assets are comprised of mutual funds, supported by assets that do not qualify for separate account reporting under GAAP.

Alternative investments
Alternative investments include partially-owned investment companies, investment funds, and limited partnerships measured at fair value using net asset value (NAV) as a practical expedient. The following table presents, by investment category, the expected liquidation period, fair value, and maximum future funding commitments of alternative investments:

			December 31		December 31
			2019		2018
(in millions of U.S. dollars)	**Expected Liquidation Period of Underlying Assets**	**Fair Value**	**Maximum Future Funding Commitments**	Fair Value	Maximum Future Funding Commitments
Financial	**2 to 10 Years**	**$ 611**	**$ 329**	$ 596	$ 193
Real Assets	**2 to 11 Years**	**712**	**422**	704	362
Distressed	**2 to 7 Years**	**263**	**80**	296	105
Private Credit	**3 to 8 Years**	**104**	**272**	147	310
Traditional	**2 to 14 Years**	**2,844**	**2,160**	2,362	2,735
Vintage	**1 to 2 Years**	**116**	**—**	56	—
Investment funds	**Not Applicable**	**271**	**—**	83	—
		$ 4,921	**$ 3,263**	$ 4,244	$ 3,705

Included in all categories in the above table, except for Investment funds, are investments for which Chubb will never have the contractual option to redeem but receives distributions based on the liquidation of the underlying assets. Further, for all categories except for Investment funds, Chubb does not have the ability to sell or transfer the investments without the consent from the general partner of individual funds.

Investment Category	Consists of investments in private equity funds:
Financial	targeting financial services companies, such as financial institutions and insurance services worldwide
Real Assets	targeting investments related to hard physical assets, such as real estate, infrastructure and natural resources
Distressed	targeting distressed corporate debt/credit and equity opportunities in the U.S.
Private Credit	targeting privately originated corporate debt investments, including senior secured loans and subordinated bonds
Traditional	employing traditional private equity investment strategies such as buyout and growth equity globally
Vintage	funds where the initial fund term has expired

Included in partially-owned investment companies and limited partnerships are 131 individual limited partnerships covering a broad range of investment strategies including large cap buyouts, specialist buyouts, growth capital, distressed, mezzanine, real estate, and co-investments. The underlying portfolio consists of various public and private debt and equity securities of publicly traded and privately held companies and real estate assets. The underlying investments across various partnerships, geographies, industries, asset types, and investment strategies provide risk diversification within the limited partnership portfolio and the overall investment portfolio.

Investment funds employ various investment strategies such as long/short equity and arbitrage/distressed. Included in this category are investments for which Chubb has the option to redeem at agreed upon value as described in each investment fund's subscription agreement. Depending on the terms of the various subscription agreements, investment fund investments may be redeemed monthly, quarterly, semi-annually, or annually. If Chubb wishes to redeem an investment fund investment, it must first determine if the investment fund is still in a lock-up period (a time when Chubb cannot redeem its investment so that the investment fund manager has time to build the portfolio). If the investment fund is no longer in its lock-up period, Chubb must then notify the investment fund manager of its intention to redeem by the notification date prescribed by the subscription agreement. Subsequent to notification, the investment fund can redeem Chubb's investment within several months of the notification. Notice periods for redemption of the investment funds range between 5 and 120 days. Chubb can redeem its investment funds without consent from the investment fund managers.

e) Investments in partially-owned insurance companies
The following table presents Investments in partially-owned insurance companies:

	December 31, 2019		December 31, 2018		
(in millions of U.S. dollars, except for percentages)	**Carrying Value**	**Direct Ownership Percentage**	Carrying Value	Direct Ownership Percentage	Domicile
Huatai Group	**$ 1,053**	**31%**	$ 452	20%	China
Huatai Life Insurance Company	**147**	**20%**	106	20%	China
Freisenbruch-Meyer	**10**	**40%**	9	40%	Bermuda
Chubb Arabia Cooperative Insurance Company	**20**	**30%**	18	30%	Saudi Arabia
Russian Reinsurance Company	**2**	**23%**	2	23%	Russia
ABR Reinsurance Ltd.	**100**	**12%**	91	12%	Bermuda
Total	**$ 1,332**		$ 678		

Huatai Group has a 100 percent ownership interest in Huatai P&C and an approximately 80 percent ownership interest in Huatai Life. At December 31, 2019, through its investment in Huatai Group, Chubb has a 30.9 percent indirect ownership in Huatai P&C and a 25 percent indirect ownership in Huatai Life. Chubb has a 20 percent direct ownership interest in Huatai Life. Therefore, Chubb's aggregate direct and indirect ownership in Huatai Life is approximately 45 percent, comprising 20 percent direct and 25 percent indirect ownership interest.

The table above excludes the 15.3 percent and 7.1 percent of additional ownership commitments in Huatai Group that are pending regulatory approvals and other important conditions. Refer to Note 2 for additional information.

f) Net investment income

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Fixed maturities	**$ 3,385**	$ 3,128	$ 2,987
Short-term investments	**84**	90	56
Other interest income	**25**	118	75
Equity securities	**26**	33	38
Other investments	**78**	104	133
Gross investment income [1]	**3,598**	3,473	3,289
Investment expenses	**(172)**	(168)	(164)
Net investment income [1]	**$ 3,426**	$ 3,305	$ 3,125
[1] Includes amortization expense related to fair value adjustment of acquired invested assets related to the Chubb Corp acquisition	**$ (161)**	$ (248)	$ (332)

g) Restricted assets
Chubb is required to maintain assets on deposit with various regulatory authorities to support its insurance and reinsurance operations. These requirements are generally promulgated in the statutory regulations of the individual jurisdictions. The assets on deposit are available to settle insurance and reinsurance liabilities. Chubb is also required to restrict assets pledged under repurchase agreements, which represent Chubb's agreement to sell securities and repurchase them at a future date for a predetermined price. We use trust funds in certain large reinsurance transactions where the trust funds are set up for the benefit of the ceding companies and generally take the place of letter of credit (LOC) requirements. We have investments in segregated portfolios primarily to provide collateral or guarantees for LOC and derivative transactions. Included in restricted assets are investments, primarily fixed maturities, totaling $21.0 billion, at both December 31, 2019 and 2018, and cash of $109 million and $93 million, respectively.

The following table presents the components of restricted assets:

(in millions of U.S. dollars)	**December 31 2019**	December 31 2018
Trust funds	**$ 14,004**	$ 13,988
Deposits with U.S. regulatory authorities	**2,466**	2,405
Deposits with non-U.S. regulatory authorities	**2,709**	2,531
Assets pledged under repurchase agreements	**1,464**	1,468
Other pledged assets	**490**	692
Total	**$ 21,133**	$ 21,084

4. Fair value measurements

a) Fair value hierarchy
Fair value of financial assets and financial liabilities is estimated based on the framework established in the fair value accounting guidance. The guidance defines fair value as the price to sell an asset or transfer a liability (an exit price) in an orderly transaction between market participants and establishes a three-level valuation hierarchy based on the reliability of the inputs. The fair value hierarchy gives the highest priority to quoted prices in active markets and the lowest priority to unobservable data.

The three levels of the hierarchy are as follows:
- Level 1 – Unadjusted quoted prices for identical assets or liabilities in active markets;
- Level 2 – Includes, among other items, inputs other than quoted prices that are observable for the asset or liability such as interest rates and yield curves, quoted prices for similar assets and liabilities in active markets, and quoted prices for identical or similar assets and liabilities in markets that are not active; and
- Level 3 – Inputs that are unobservable and reflect management's judgments about assumptions that market participants would use in pricing an asset or liability.

We categorize financial instruments within the valuation hierarchy at the balance sheet date based upon the lowest level of inputs that are significant to the fair value measurement.

We use pricing services to obtain fair value measurements for the majority of our investment securities. Based on management's understanding of the methodologies used, these pricing services only produce an estimate of fair value if there is observable market information that would allow them to make a fair value estimate. Based on our understanding of the market inputs used by the pricing services, all applicable investments have been valued in accordance with GAAP. We do not adjust prices obtained from pricing services. The following is a description of the valuation techniques and inputs used to determine fair values for financial instruments carried at fair value, as well as the general classification of such financial instruments pursuant to the valuation hierarchy.

Fixed maturities
We use pricing services to estimate fair value measurements for the majority of our fixed maturities. The pricing services use market quotations for fixed maturities that have quoted prices in active markets; such securities are classified within Level 1. For fixed maturities other than U.S. Treasury securities that generally do not trade on a daily basis, the pricing services prepare estimates of fair value measurements using their pricing applications, which include available relevant market information, benchmark curves, benchmarking of like securities, sector groupings, and matrix pricing. Additional valuation factors that can be taken into account are nominal spreads, dollar basis, and liquidity adjustments. The pricing services evaluate each asset class based on relevant market and credit information, perceived market movements, and sector news. The market inputs used in the pricing evaluation, listed in the approximate order of priority include: benchmark yields, reported trades, broker/dealer quotes, issuer spreads, two-sided markets, benchmark securities, bids, offers, reference data, and industry and economic events. The extent of the use of each input is dependent on the asset class and the market conditions. Given the asset class, the priority of the use of inputs may change, or some market inputs may not be relevant. Additionally, fixed maturities valuation is more subjective when markets are less liquid due to the lack of market based inputs (i.e., stale pricing), which may increase the potential that an investment's estimated fair value is not reflective of the price at which an actual transaction would occur. The overwhelming majority of fixed maturities are classified within Level 2 because the most significant inputs used in the pricing techniques are observable. For a small number of fixed maturities, we obtain a single broker quote (typically from a market maker). Due to the disclaimers on the quotes that indicate that the price is indicative only, we include these fair value estimates in Level 3.

Equity securities
Equity securities with active markets are classified within Level 1 as fair values are based on quoted market prices. For equity securities in markets which are less active, fair values are based on market valuations and are classified within Level 2. Equity securities for which pricing is unobservable are classified within Level 3.

Short-term investments
Short-term investments, which comprise securities due to mature within one year of the date of purchase that are traded in active markets, are classified within Level 1 as fair values are based on quoted market prices. Securities such as commercial paper and discount notes are classified within Level 2 because these securities are typically not actively traded due to their approaching maturity, and as such, their cost approximates fair value. Short-term investments for which pricing is unobservable are classified within Level 3.

Other investments
Fair values for the majority of Other investments including investments in partially-owned investment companies, investment funds, and limited partnerships are based on their respective net asset values or equivalent (NAV) and are excluded from the fair value hierarchy table below. Certain of our long-duration contracts are supported by assets that do not qualify for separate account reporting under GAAP. These assets comprise mutual funds, classified within Level 1 in the valuation hierarchy on the same basis as other equity securities traded in active markets. Other investments also include equity securities, classified within Level 1 and fixed maturities, classified within Level 2, held in rabbi trusts maintained by Chubb for deferred compensation plans and supplemental retirement plans and are classified within the valuation hierarchy on the same basis as other equity securities and fixed maturities. Other investments for which pricing is unobservable are classified within Level 3.

Securities lending collateral
The underlying assets included in Securities lending collateral in the Consolidated balance sheets are fixed maturities which are classified in the valuation hierarchy on the same basis as other fixed maturities. Excluded from the valuation hierarchy is the corresponding liability related to Chubb's obligation to return the collateral plus interest as it is reported at contract value and not fair value in the Consolidated balance sheets.

Investment derivative instruments
Actively traded investment derivative instruments, including futures, options, and forward contracts are classified within Level 1 as fair values are based on quoted market prices. The fair value of cross-currency swaps and interest rate swaps is based on market valuations and is classified within Level 2. Investment derivative instruments are recorded in either Other assets or Accounts payable, accrued expenses, and other liabilities in the Consolidated balance sheets.

Other derivative instruments
We maintain positions in exchange-traded equity futures contracts designed to limit exposure to a severe equity market decline, which would cause an increase in expected claims and, therefore, an increase in reserves for our guaranteed minimum death benefits (GMDB) and guaranteed living benefits (GLB) reinsurance business. Our positions in exchange-traded equity futures contracts are classified within Level 1. The fair value of the majority of the remaining positions in other derivative instruments is based on significant observable inputs including equity security and interest rate indices. Accordingly, these are classified within Level 2. Other derivative instruments based on unobservable inputs are classified within Level 3. Other derivative instruments are recorded in either Other assets or Accounts payable, accrued expenses, and other liabilities in the Consolidated balance sheets.

Separate account assets
Separate account assets represent segregated funds where investment risks are borne by the customers, except to the extent of certain guarantees made by Chubb. Separate account assets comprise mutual funds classified within Level 1 in the valuation hierarchy on the same basis as other equity securities traded in active markets. Separate account assets also include fixed maturities classified within Level 2 because the most significant inputs used in the pricing techniques are observable. Excluded from the valuation hierarchy are the corresponding liabilities as they are reported at contract value and not fair value in the Consolidated balance sheets. Separate account assets are recorded in Other assets in the Consolidated balance sheets.

Guaranteed living benefits
The GLB arises from life reinsurance programs covering living benefit guarantees whereby we assume the risk of guaranteed minimum income benefits (GMIB) associated with variable annuity contracts. GLB's are recorded in Accounts payable, accrued expenses, and other liabilities and Future policy benefits in the Consolidated balance sheets. For GLB reinsurance, Chubb estimates fair value using an internal valuation model which includes current market information and estimates of policyholder behavior. All of the treaties contain claim limits, which are factored into the valuation model. The fair value depends on a number of factors, including interest rates, equity markets, credit risk, current account value, market volatility, expected annuitization rates and other policyholder behavior, and changes in policyholder mortality. Because of the significant use of unobservable inputs including policyholder behavior, GLB reinsurance is classified within Level 3.

Financial instruments measured at fair value on a recurring basis, by valuation hierarchy

December 31, 2019 (in millions of U.S. dollars)	Level 1	Level 2	Level 3	Total
Assets:				
Fixed maturities available for sale				
U.S. Treasury and agency	$ 2,664	$ 619	$ —	$ 3,283
Foreign	—	23,258	449	23,707
Corporate securities	—	30,340	1,451	31,791
Mortgage-backed securities	—	19,132	60	19,192
States, municipalities, and political subdivisions	—	7,515	—	7,515
	2,664	80,864	1,960	85,488
Equity securities	728	15	69	812
Short-term investments	2,803	1,482	6	4,291
Other investments (1)	412	377	10	799
Securities lending collateral	—	994	—	994
Investment derivative instruments	24	—	—	24
Other derivative instruments	2	—	—	2
Separate account assets	3,437	136	—	3,573
Total assets measured at fair value (1)	$ 10,070	$ 83,868	$ 2,045	$ 95,983
Liabilities:				
Investment derivative instruments	$ 93	$ —	$ —	$ 93
Other derivative instruments	13	—	—	13
GLB (2)	—	—	456	456
Total liabilities measured at fair value	$ 106	$ —	$ 456	$ 562

(1) Excluded from the table above are partially-owned investments, investment funds, and limited partnerships of $4,921 million and other investments of $95 million at December 31, 2019 measured using NAV as a practical expedient.

(2) Our GLB reinsurance product meets the definition of a derivative instrument for accounting purposes and is accordingly carried at fair value. Excluded from the table above is the portion of the GLB derivative liability classified as Future policy benefits in the Consolidated balance sheets. Refer to Note 5 c) for additional information.

December 31, 2018 (in millions of U.S. dollars)	Level 1	Level 2	Level 3	Total
Assets:				
Fixed maturities available for sale				
U.S. Treasury and agency	$ 3,400	$ 745	$ —	$ 4,145
Foreign	—	21,071	345	21,416
Corporate securities	—	25,284	1,299	26,583
Mortgage-backed securities	—	15,479	61	15,540
States, municipalities, and political subdivisions	—	10,786	—	10,786
	3,400	73,365	1,705	78,470
Equity securities	713	—	57	770
Short-term investments	1,575	1,440	1	3,016
Other investments (1)	381	303	11	695
Securities lending collateral	—	1,926	—	1,926
Investment derivative instruments	28	—	—	28
Other derivative instruments	25	—	—	25
Separate account assets	2,686	137	—	2,823
Total assets measured at fair value (1)	$ 8,808	$ 77,171	$ 1,774	$ 87,753
Liabilities:				
Investment derivative instruments	$ 38	$ 115	$ —	$ 153
GLB (2)	—	—	452	452
Total liabilities measured at fair value	$ 38	$ 115	$ 452	$ 605

(1) Excluded from the table above are partially-owned investments, investment funds, and limited partnerships of $4,244 million and other investments of $95 million at December 31, 2018 measured using NAV as a practical expedient.

(2) Our GLB reinsurance product meets the definition of a derivative instrument for accounting purposes and is accordingly carried at fair value. Excluded from the table above is the portion of the GLB derivative liability classified as Future policy benefits in the Consolidated balance sheets. Refer to Note 5 c) for additional information.

Level 3 financial instruments
The following table presents the significant unobservable inputs used in the Level 3 liability valuations. Excluded from the table below are inputs used to determine the fair value of Level 3 assets which are based on single broker quotes and contain no quantitative unobservable inputs developed by management. The majority of our fixed maturities classified as Level 3 used external pricing when markets are less liquid due to the lack of market inputs (i.e., stale pricing, broker quotes).

(in millions of U.S. dollars, except for percentages)	Fair Value at December 31 2019	Valuation Technique	Significant Unobservable Inputs	Ranges	Weighted Average (1)
GLB (1)	**$ 456**	**Actuarial model**	**Lapse rate**	**3% – 34%**	**4.3%**
			Annuitization rate	**0% – 52%**	**3.2%**

(1) The weighted average lapse and annuitization rates are determined by weighting each treaty's rates by the GLB contracts fair value.

The most significant policyholder behavior assumptions include lapse rates and the GMIB annuitization rates. Assumptions regarding lapse rates and GMIB annuitization rates differ by treaty, but the underlying methodologies to determine rates applied to each treaty are comparable.

A lapse rate is the percentage of in-force policies surrendered in a given calendar year. All else equal, as lapse rates increase, ultimate claim payments will decrease. In general, the base lapse function assumes low lapse rates during the surrender charge period of the GMIB contract, followed by a “spike” lapse rate in the year immediately following the surrender charge period, and then reverting to an ultimate lapse rate, typically over a 2-year period. This base rate is adjusted downward for policies with more valuable guarantees (policies with guaranteed values far in excess of their account values). Partial withdrawals and the impact of older policyholders with tax-qualified contracts (due to required minimum distributions) are also reflected in our modeling.

The GMIB annuitization rate is the percentage of policies for which the policyholder will elect to annuitize using the guaranteed benefit provided under the GMIB. All else equal, as GMIB annuitization rates increase, ultimate claim payments will increase, subject to treaty claim limits. All GMIB reinsurance treaties include claim limits to protect Chubb in the event that actual annuitization behavior is significantly higher than expected. In general, Chubb assumes that GMIB annuitization rates will be higher for policies with more valuable guarantees (policies with guaranteed values far in excess of their account values). Chubb also assumes that GMIB annuitization rates increase as policyholders get older. In addition, we also assume that GMIB annuitization rates are higher in the first year immediately following the waiting period (the first year the policies are eligible to annuitize using the GMIB) in comparison to all subsequent years. We do not yet have fully credible annuitization experience for all clients.

The effect of changes in key market factors on assumed lapse and annuitization rates reflect emerging trends using data available from cedants. For treaties with limited experience, rates are established in line with data received from other ceding companies adjusted, as appropriate, with industry estimates. The model and related assumptions are regularly re-evaluated by management and enhanced, as appropriate, based upon additional experience obtained related to policyholder behavior and availability of updated information such as market conditions, market participant assumptions, and demographics of in-force annuities. In the fourth quarter of 2019, we completed a review of policyholder behavior related to annuitizations, partial withdrawals, lapses, and mortality for our variable annuity reinsurance business.

- As annuitization experience continued to emerge, we refined our annuitization assumptions including age-based behavior. Additionally, for policies with highly valuable guarantees we increased our annuitization assumptions to reflect recent trends. These refinements resulted in a net increase to the fair value of GLB liabilities generating a realized loss of approximately $91 million.
- We refined our mortality assumptions based on additional emerging experience. We also updated our reference mortality table to a more recent industry table. The updated mortality rates increased the fair value of GLB liabilities generating a realized loss of approximately $11 million.
- Lapse and partial withdrawal assumptions were also refined based on additional emerging experience. The change in lapse and partial withdrawal assumptions had an insignificant impact on the fair value of GLB liabilities.

During the year ended December 31, 2019, we also made routine model refinements to the internal valuation model which resulted in a net increase in the fair value of GLB liabilities generating a realized loss of approximately $25 million.

The following tables present a reconciliation of the beginning and ending balances of financial instruments measured at fair value using significant unobservable inputs (Level 3):

	Assets						Liabilities
	Available-for-Sale Debt Securities						
Year Ended December 31, 2019 (in millions of U.S. dollars)	Foreign	Corporate securities	MBS	Equity securities	Short-term investments	Other investments	GLB (1)
Balance, beginning of year	$ 345	$ 1,299	$ 61	$ 57	$ 1	$ 11	$ 452
Transfers into Level 3	11	23	—	—	—	—	—
Transfers out of Level 3	(24)	(38)	(16)	—	—	—	—
Change in Net Unrealized Gains/Losses in OCI	13	(2)	—	1	—	—	—
Net Realized Gains/Losses	(1)	(4)	—	(2)	—	—	4
Purchases	228	577	19	34	6	—	—
Sales	(70)	(125)	(1)	(21)	—	—	—
Settlements	(53)	(279)	(3)	—	(1)	(1)	—
Balance, end of year	$ 449	$ 1,451	$ 60	$ 69	$ 6	$ 10	$ 456
Net Realized Gains/Losses Attributable to Changes in Fair Value at the Balance Sheet Date	$ —	$ (2)	$ —	$ (3)	$ —	$ —	$ 4
Change in Net Unrealized Gains/Losses included in OCI at the Balance Sheet Date	$ 7	$ (8)	$ —	$ —	$ —	$ —	$ —

(1) Excluded from the table above is the portion of the GLB derivative liability classified as Future policy benefits. Refer to Note 5 c) for additional information.

Year Ended December 31, 2018 (in millions of U.S. dollars)	Assets						Liabilities	
	Available-for-Sale Debt Securities							
	Foreign	Corporate securities	MBS	Equity securities	Short-term investments	Other investments	Other derivative instruments	GLB (1)
Balance, beginning of year	$ 93	$ 1,037	$ 78	$ 44	$ —	$ 263	$ 2	$ 204
Transfers into Level 3	13	24	1	—	5	—	—	—
Transfers out of Level 3	(2)	(31)	(3)	—	—	(252)	—	—
Change in Net Unrealized Gains/Losses in OCI	(12)	(4)	—	(2)	—	(2)	—	—
Net Realized Gains/Losses	(3)	(5)	—	6	—	1	(2)	248
Purchases	334	672	5	37	9	50	—	—
Sales	(69)	(164)	—	(28)	—	—	—	—
Settlements	(9)	(230)	(20)	—	(13)	(49)	—	—
Balance, end of year	$ 345	$ 1,299	$ 61	$ 57	$ 1	$ 11	$ —	$ 452
Net Realized Gains/Losses Attributable to Changes in Fair Value at the Balance Sheet Date	$ (1)	$ (7)	$ —	$ (1)	$ —	$ 1	$ —	$ 248

(1) Our GLB reinsurance product meets the definition of a derivative instrument for accounting purposes and is accordingly carried at fair value. Excluded from the table above is the portion of the GLB derivative liability classified as Future policy benefits in the Consolidated balance sheets. The liability for GLB reinsurance was $861 million at December 31, 2018 and $550 million at December 31, 2017, which includes a fair value derivative adjustment of $452 million and $204 million, respectively.

Year Ended December 31, 2017 (in millions of U.S. dollars)	Assets						Liabilities	
	Available-for-Sale Debt Securities							
	Foreign	Corporate securities (1)	MBS	Equity securities	Short-term investments	Other investments	Other derivative instruments	GLB (2)
Balance, beginning of year	$ 74	$ 681	$ 45	$ 41	$ 25	$ 225	$ 13	$ 559
Transfers into Level 3	—	231	50	—	—	—	—	9
Transfers out of Level 3	(3)	(93)	—	—	—	—	(9)	—
Change in Net Unrealized Gains/Losses in OCI	3	(12)	—	(1)	—	6	—	—
Net Realized Gains/Losses	—	—	—	2	—	—	(2)	(364)
Purchases	84	521	8	24	16	56	—	—
Sales	(59)	(111)	(1)	(22)	—	—	—	—
Settlements	(6)	(180)	(24)	—	(41)	(24)	—	—
Balance, end of year	$ 93	$ 1,037	$ 78	$ 44	$ —	$ 263	$ 2	$ 204
Net Realized Gains/Losses Attributable to Changes in Fair Value at the Balance Sheet Date	$ (1)	$ (2)	$ —	$ (1)	$ —	$ —	$ (2)	$ (364)

(1) Transfers into and Purchases in Level 3 primarily consist of privately-placed fixed income securities.
(2) Our GLB reinsurance product meets the definition of a derivative instrument for accounting purposes and is accordingly carried at fair value. Excluded from the table above is the portion of the GLB derivative liability classified as Future policy benefits in the Consolidated balance sheets. The liability for GLB reinsurance was $550 million at December 31, 2017 and $853 million at December 31, 2016, which includes a fair value derivative adjustment of $204 million and $559 million, respectively.

b) Financial instruments disclosed, but not measured, at fair value
Chubb uses various financial instruments in the normal course of its business. Our insurance contracts are excluded from fair value of financial instruments accounting guidance, and therefore, are not included in the amounts discussed below.

The carrying values of cash, other assets, other liabilities, and other financial instruments not included below approximated their fair values.

Investments in partially-owned insurance companies
Fair values for investments in partially-owned insurance companies are based on Chubb's share of the net assets based on the financial statements provided by those companies and are excluded from the valuation hierarchy tables below.

Short- and long-term debt, repurchase agreements, and trust preferred securities
Where practical, fair values for short-term debt, long-term debt, repurchase agreements, and trust preferred securities are estimated using discounted cash flow calculations based principally on observable inputs including incremental borrowing rates, which reflect Chubb's credit rating, for similar types of borrowings with maturities consistent with those remaining for the debt being valued.

The following tables present fair value, by valuation hierarchy, and carrying value of the financial instruments not measured at fair value:

December 31, 2019				**Fair Value**	
(in millions of U.S. dollars)	**Level 1**	**Level 2**	**Level 3**	**Total**	**Carrying Value**
Assets:					
Fixed maturities held to maturity					
U.S. Treasury and agency	**$ 1,292**	**$ 55**	**$ —**	**$ 1,347**	**$ 1,318**
Foreign	**—**	**1,485**	**—**	**1,485**	**1,423**
Corporate securities	**—**	**2,436**	**32**	**2,468**	**2,349**
Mortgage-backed securities	**—**	**2,396**	**—**	**2,396**	**2,331**
States, municipalities, and political subdivisions	**—**	**5,309**	**—**	**5,309**	**5,160**
Total assets	**$ 1,292**	**$ 11,681**	**$ 32**	**$ 13,005**	**$ 12,581**
Liabilities:					
Repurchase agreements	**$ —**	**$ 1,416**	**$ —**	**$ 1,416**	**$ 1,416**
Short-term debt	**—**	**1,307**	**—**	**1,307**	**1,299**
Long-term debt	**—**	**15,048**	**—**	**15,048**	**13,559**
Trust preferred securities	**—**	**467**	**—**	**467**	**308**
Total liabilities	**$ —**	**$ 18,238**	**$ —**	**$ 18,238**	**$ 16,582**

December 31, 2018				Fair Value	
(in millions of U.S. dollars)	Level 1	Level 2	Level 3	Total	Carrying Value
Assets:					
Fixed maturities held to maturity					
U.S. Treasury and agency	$ 1,128	$ 54	$ —	$ 1,182	$ 1,185
Foreign	—	1,542	—	1,542	1,549
Corporate securities	—	2,477	31	2,508	2,601
Mortgage-backed securities	—	2,486	—	2,486	2,524
States, municipalities, and political subdivisions	—	5,541	—	5,541	5,576
Total assets	$ 1,128	$ 12,100	$ 31	$ 13,259	$ 13,435
Liabilities:					
Repurchase agreements	$ —	$ 1,418	$ —	$ 1,418	$ 1,418
Short-term debt	—	516	—	516	509
Long-term debt	—	12,181	—	12,181	12,087
Trust preferred securities	—	409	—	409	308
Total liabilities	$ —	$ 14,524	$ —	$ 14,524	$ 14,322

5. Reinsurance

a) Consolidated reinsurance

Chubb purchases reinsurance to manage various exposures including catastrophe risks. Although reinsurance agreements contractually obligate Chubb's reinsurers to reimburse it for the agreed-upon portion of its gross paid losses, they do not discharge Chubb's primary liability. The amounts for net premiums written and net premiums earned in the Consolidated statements of operations are net of reinsurance. The following table presents direct, assumed, and ceded premiums:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Premiums written			
Direct	**$ 36,848**	$ 34,782	$ 33,137
Assumed	**3,276**	3,186	3,239
Ceded	**(7,849)**	(7,389)	(7,132)
Net	**$ 32,275**	$ 30,579	$ 29,244
Premiums earned			
Direct	**$ 35,876**	$ 34,108	$ 32,782
Assumed	**3,107**	3,175	3,332
Ceded	**(7,693)**	(7,219)	(7,080)
Net	**$ 31,290**	$ 30,064	$ 29,034

Ceded losses and loss expenses incurred were $4.9 billion, $5.6 billion, and $5.5 billion for the years ended December 31, 2019, 2018, and 2017, respectively.

b) Reinsurance recoverable on ceded reinsurance

	December 31, 2019		December 31, 2018	
(in millions of U.S. dollars)	**Net Reinsurance Recoverable [(1)]**	**Provision for Uncollectible**	Net Reinsurance Recoverable [(1)]	Provision for Uncollectible
Reinsurance recoverable on unpaid losses and loss expenses	**$ 14,181**	**$ 240**	$ 14,689	$ 251
Reinsurance recoverable on paid losses and loss expenses	**1,000**	**76**	1,304	72
Reinsurance recoverable on losses and loss expenses	**$ 15,181**	**$ 316**	$ 15,993	$ 323
Reinsurance recoverable on policy benefits	**$ 197**	**$ 4**	$ 202	$ 4

(1) Net of provision for uncollectible reinsurance.

The decrease in reinsurance recoverable on losses and loss expenses in 2019 was primarily due to collections, principally on catastrophe losses.

We evaluate the financial condition of our reinsurers and potential reinsurers on a regular basis and also monitor concentrations of credit risk with reinsurers. The provision for uncollectible reinsurance is required principally due to the potential failure of reinsurers to indemnify Chubb, primarily because of disputes under reinsurance contracts and insolvencies. We have established provisions for amounts estimated to be uncollectible on both unpaid and paid losses as well as future policy benefits.

The following tables present a listing, at December 31, 2019, of the categories of Chubb's reinsurers:

December 31, 2019 (in millions of U.S. dollars, except for percentages)	Gross Reinsurance Recoverable on Loss and Loss Expenses	Provision for Uncollectible Reinsurance	% of Gross Reinsurance Recoverable
Categories			
Largest reinsurers	$ 6,594	$ 72	1.1%
Other reinsurers rated A- or better	4,624	55	1.2%
Other reinsurers with ratings lower than A- or not rated	478	70	14.6%
Pools	379	15	4.0%
Structured settlements	535	15	2.8%
Captives	2,647	20	0.8%
Other	240	69	28.8%
Total	$ 15,497	$ 316	2.0%

Largest Reinsurers

ABR Reinsurance Capital Holdings	HDI Group (Hannover Re)	Munich Re Group	Swiss Re Group
Berkshire Hathaway Insurance Group	Lloyd's of London	Partner Re Group	

Categories of Chubb's reinsurers	Comprises:
Largest reinsurers	• All groups of reinsurers or captives where the gross recoverable exceeds one percent of Chubb's total shareholders' equity.
Other reinsurers rated A- or better	• All reinsurers rated A- or better that were not included in the largest reinsurer category.
Other reinsurers rated lower than A- or not rated	• All reinsurers rated lower than A- or not rated that were not included in the largest reinsurer category.
Pools	• Related to Chubb's voluntary pool participation and Chubb's mandatory pool participation required by law in certain states.
Structured settlements	• Annuities purchased from life insurance companies to settle claims. Since we retain ultimate liability in the event that the life company fails to pay, we reflect the amounts as both a liability and a recoverable/receivable for GAAP purposes.
Captives	• Companies established and owned by our insurance clients to assume a significant portion of their direct insurance risk from Chubb; structured to allow clients to self-insure a portion of their reinsurance risk. It generally is our policy to obtain collateral equal to expected losses. Where appropriate, exceptions are granted but only with review and approval at a senior officer level. Excludes captives included in the largest reinsurer category.
Other	• Amounts recoverable that are in dispute or are from companies that are in supervision, rehabilitation, or liquidation.

The provision for uncollectible reinsurance is principally based on an analysis of the credit quality of the reinsurer and collateral balances. We establish the provision for uncollectible reinsurance for the Other category based on a case-by-case analysis of individual situations including the merits of the underlying matter, credit and collateral analysis, and consideration of our collection experience in similar situations.

c) Assumed life reinsurance programs involving minimum benefit guarantees under variable annuity contracts
The following table presents income and expenses relating to GMDB and GLB reinsurance. GLBs include GMIBs.

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
GMDB			
Net premiums earned	**$ 41**	$ 47	$ 49
Policy benefits and other reserve adjustments	**$ —**	$ 20	$ 40
GLB			
Net premiums earned	**$ 92**	$ 96	$ 110
Policy benefits and other reserve adjustments	**122**	110	105
Net realized gains (losses)	**(6)**	(250)	363
Gain (loss) recognized in Net income	**$ (36)**	$ (264)	$ 368
Net cash received and other	**—**	47	65
Net decrease (increase) in liability	**$ (36)**	$ (311)	$ 303

Net realized gains (losses) in the table above include gains (losses) related to foreign exchange and fair value adjustments on insurance derivatives and exclude gains (losses) on S&P futures used to partially offset the risk in the GLB reinsurance portfolio. Refer to Note 10 for additional information.

At December 31, 2019 and 2018, the reported liability for GMDB reinsurance was $83 million and $117 million, respectively. At December 31, 2019 and 2018, the reported liability for GLB reinsurance was $897 million and $861 million, respectively, which includes a fair value derivative adjustment of $456 million and $452 million, respectively. Reported liabilities for both GMDB and GLB reinsurance are determined using internal valuation models. Such valuations require considerable judgment and are subject to significant uncertainty. The valuation of these products is subject to fluctuations arising from, among other factors, changes in interest rates, changes in equity markets, changes in credit markets, changes in the allocation of the investments underlying annuitants' account values, and assumptions regarding future policyholder behavior. These models and the related assumptions are regularly reviewed by management and enhanced, as appropriate, based upon improvements in modeling assumptions and availability of updated information, such as market conditions and demographics of in-force annuities.

Variable Annuity Net Amount at Risk

The net amount at risk is defined as the present value of future claim payments assuming policy account values and guaranteed values are fixed at the valuation date (December 31, 2019 and 2018, respectively) and reinsurance coverage ends at the earlier of the maturity of the underlying variable annuity policy or the reinsurance treaty. In addition, the following assumptions were used:

(in millions of U.S. dollars, except for percentages)		Net amount at risk				
Reinsurance covering		December 31 2019	December 31 2018	2019 Future claims discount rate	Other assumptions	Total claims at 100% mortality at December 31, 2019[1]
GMDB Risk Only		$ 256	$ 408	3.8% - 4.0%	No lapses or withdrawals	$ 167
					Mortality according to 100% of the Annuity 2000 mortality table	
GLB Risk Only		$ 1,095	$ 1,233	4.0% - 4.3%	No deaths, lapses or withdrawals	N/A
					Annuitization at a frequency most disadvantageous to Chubb[2]	
					Claim calculated using interest rates in line with rates used to calculate reserve	
Both Risks: [3]	GMDB	$ 91	$ 103	4.0% - 4.3%	No lapses or withdrawals	$ 16
					Mortality according to 100% of the Annuity 2000 mortality table	
	GLB	$ 415	$ 517	4.0% - 4.3%	Annuitization at a frequency most disadvantageous to Chubb[2]	N/A
					Claim calculated using interest rates in line with rates used to calculate reserve	

(1) Takes into account all applicable reinsurance treaty claim limits.
(2) Annuitization at a level that maximizes claims taking into account the treaty limits.
(3) Covering both the GMDB and GLB risks on the same underlying policyholders.

The average attained age of all policyholders for all risk categories above, weighted by the guaranteed value of each reinsured policy, is approximately 72 years.

6. Goodwill and Other intangible assets

At both December 31, 2019 and 2018, Goodwill was $15.3 billion and Other intangible assets were $6.1 billion. The majority of the Other intangible assets balance at both December 31, 2019 and 2018 relates to the Chubb Corp acquisition and comprises of $3.2 billion that are subject to amortization, principally agency distribution relationships and renewal rights, and $2.9 billion that are not subject to amortization, principally trademarks.

a) Goodwill

The following table presents a roll-forward of Goodwill by segment:

(in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Life Insurance	Chubb Consolidated
Balance at December 31, 2017	$ 6,976	$ 2,240	$ 134	$ 5,004	$ 365	$ 822	$ 15,541
Foreign exchange revaluation and other	(30)	(10)	—	(234)	6	(2)	(270)
Balance at December 31, 2018	$ 6,946	$ 2,230	$ 134	$ 4,770	$ 371	$ 820	$ 15,271
Foreign exchange revaluation and other	**9**	**4**	**—**	**15**	**—**	**(3)**	**25**
Balance at December 31, 2019	**$ 6,955**	**$ 2,234**	**$ 134**	**$ 4,785**	**$ 371**	**$ 817**	**$ 15,296**

b) Other intangible assets
Amortization expense related to purchased intangibles were $305 million, $339 million, and $260 million for the years ended December 31, 2019, 2018, and 2017, principally related to agency distribution relationships and renewal rights.

The following table presents, as of December 31, 2019, the expected estimated pre-tax amortization expense (benefit) of purchased intangibles, at current foreign currency exchange rates, for the next five years:

	Associated with the Chubb Corp Acquisition				
For the Years Ending December 31 (in millions of U.S. dollars)	Agency distribution relationships and renewal rights	Fair value adjustment on Unpaid losses and loss expense (1)	Total	Other intangible assets	Total Amortization of purchased intangibles
2020	$ 239	$ (35)	$ 204	$ 86	$ 290
2021	216	(20)	196	84	280
2022	196	(14)	182	93	275
2023	177	(7)	170	91	261
2024	159	(5)	154	85	239
Total	$ 987	$ (81)	$ 906	$ 439	$ 1,345

(1) In connection with the Chubb Corp acquisition, we recorded an increase to Unpaid losses and loss expenses acquired to adjust the carrying value of Chubb Corp's historical Unpaid losses and loss expenses to fair value as of the acquisition date. This fair value adjustment amortizes through Amortization of purchased intangibles on the Consolidated statements of operations through the year 2032. The balance of the fair value adjustment on Unpaid losses and loss expense was $145 million and $207 million at December 31, 2019 and 2018, respectively. Refer to Note 1(h) for additional information.

c) VOBA
The following table presents a roll-forward of VOBA:

(in millions of U.S. dollars)	**2019**	2018	2017
Balance, beginning of year	**$ 295**	$ 326	$ 355
Acquisition of Banchile Seguros de Vida	**35**	—	—
Amortization of VOBA (1)	**(24)**	(25)	(35)
Foreign exchange revaluation	**—**	(6)	6
Balance, end of year	**$ 306**	$ 295	$ 326

(1) Recognized in Policy acquisition costs in the Consolidated statements of operations.

The following table presents, as of December 31, 2019, the expected estimated pre-tax amortization expense related to VOBA for the next five years:

For the Year Ending December 31 (in millions of U.S. dollars)	VOBA
2020	$ 26
2021	24
2022	22
2023	21
2024	19
Total	$ 112

7. Unpaid losses and loss expenses

Chubb establishes reserves for the estimated unpaid ultimate liability for losses and loss expenses under the terms of its policies and agreements. Reserves include estimates for both claims that have been reported and for IBNR claims, and include estimates of expenses associated with processing and settling these claims. Reserves are recorded in Unpaid losses and loss expenses in the consolidated balance sheets. While we believe that our reserves for unpaid losses and loss expenses at December 31, 2019 are adequate, new information or trends may lead to future developments in incurred loss and loss expenses significantly greater or less than the reserves provided. Any such revisions could result in future changes in estimates of losses or reinsurance recoverable and would be reflected in our results of operations in the period in which the estimates are changed.

The following table presents a reconciliation of beginning and ending Unpaid losses and loss expenses:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Gross unpaid losses and loss expenses, beginning of year	**$ 62,960**	$ 63,179	$ 60,540
Reinsurance recoverable on unpaid losses (1)	**(14,689)**	(14,014)	(12,708)
Net unpaid losses and loss expenses, beginning of year	**48,271**	49,165	47,832
Net losses and loss expenses incurred in respect of losses occurring in:			
Current year	**19,575**	19,048	19,391
Prior years (2)	**(845)**	(981)	(937)
Total	**18,730**	18,067	18,454
Net losses and loss expenses paid in respect of losses occurring in:			
Current year	**7,894**	7,544	6,575
Prior years	**10,579**	10,796	10,873
Total	**18,473**	18,340	17,448
Foreign currency revaluation and other	**(19)**	(621)	327
Net unpaid losses and loss expenses, end of year	**48,509**	48,271	49,165
Reinsurance recoverable on unpaid losses (1)	**14,181**	14,689	14,014
Gross unpaid losses and loss expenses, end of year	**$ 62,690**	$ 62,960	$ 63,179

(1) Net of provision for uncollectible reinsurance.

(2) Relates to prior period loss reserve development only and excludes prior period development related to reinstatement premiums, expense adjustments and earned premiums totaling $53 million, $85 million and $108 million for 2019, 2018, and 2017, respectively.

The increase in net unpaid losses and loss expense in 2019 reflected an increase in underlying reserves, offset by favorable prior period development and payments related to catastrophic events. The decrease in gross and net unpaid losses and loss expenses in 2018 was primarily driven by payments related to the 2017 catastrophic events, favorable prior period development and foreign exchange movement, partially offset by catastrophic events in 2018.

The loss development tables under section c) below, present Chubb's historical incurred and paid claims development by broad product line through December 31, 2019, net of reinsurance, as well as the cumulative number of reported claims, IBNR balances, and other supplementary information.

The following table presents a reconciliation of the loss development tables to the liability for unpaid losses and loss expenses in the consolidated balance sheet:

Reconciliation of Reserve Balances to Liability for Unpaid Loss and Loss Expenses

(in millions of U.S. dollars)		December 31, 2019
Presented in the loss development tables:		
North America Commercial P&C Insurance — Workers' Compensation	$	9,414
North America Commercial P&C Insurance — Liability		16,447
North America Commercial P&C Insurance — Other Casualty		1,913
North America Commercial P&C Insurance — Non-Casualty		1,759
North America Personal P&C Insurance		2,525
Overseas General Insurance — Casualty		5,977
Overseas General Insurance — Non-Casualty		2,377
Global Reinsurance — Casualty		1,177
Global Reinsurance — Non-Casualty		255
Excluded from the loss development tables:		
Other		4,218
Net unpaid loss and allocated loss adjustment expense		46,062
Ceded unpaid loss and allocated loss adjustment expense:		
North America Commercial P&C Insurance — Workers' Compensation	$	1,657
North America Commercial P&C Insurance — Liability		5,400
North America Commercial P&C Insurance — Other Casualty		546
North America Commercial P&C Insurance — Non-Casualty		1,150
North America Personal P&C Insurance		603
Overseas General Insurance — Casualty		2,113
Overseas General Insurance — Non-Casualty		1,263
Global Reinsurance — Casualty		35
Global Reinsurance — Non-Casualty		107
Other		1,457
Ceded unpaid loss and allocated loss adjustment expense		14,331
Unpaid loss and loss expense on other than short-duration contracts [1]		873
Unpaid unallocated loss adjustment expenses		1,424
Unpaid losses and loss expenses	$	62,690

(1)Primarily includes the claims reserve of our International A&H business and Life Insurance segment reserves.

Business excluded from the loss development tables
"Other" shown in the reconciliation table above comprises businesses excluded from the loss development tables below:

- North America Agricultural Insurance segment business, which is short-tailed with the majority of the liabilities expected to be resolved in the ensuing twelve months;
- Corporate segment business, which includes run-off liabilities such as asbestos and environmental and other mass tort exposures and which impact accident years older than those shown in the exhibits below;
- Life Insurance segment business, which is generally written using long-duration contracts; and
- Certain subsets of our business due to data limitations or unsuitability to the development table presentation, including:
    - We underwrite loss portfolio transfers at various times; by convention, all premium and losses associated with these transactions are recorded to the policy period of the transaction, even though the accident dates of the claims covered may be a decade or more in the past. We also underwrite certain high attachment, high limit, multiple-line and excess of aggregate coverages for large commercial clients. Changes in incurred loss and cash flow patterns are volatile and sufficiently different from those of typical insureds. This category includes the loss portfolio transfer of Fireman's Fund personal lines run-off liabilities and Alternative Risk Solutions business within the North America Commercial P&C segment;
    - 2015 and prior paid history on a subset of previously acquired international businesses, within the Overseas General Insurance segment, due to limitations on the data prior to the acquisition;
    - Reinsurance recoverable bad debt;
    - Purchase accounting adjustments related to unpaid losses and loss expenses for Chubb Corp.

a) Description of Reserving Methodologies
Our recorded reserves represent management's best estimate of the provision for unpaid claims as of the balance sheet date. The process of establishing loss and loss expense reserves can be complex and is subject to considerable uncertainty as it requires the use of estimates and judgments based on circumstances underlying the insured loss at the date of accrual. The reserves for our various product lines each require different qualitative and quantitative assumptions and judgments to be made. Management's best estimate is developed after collaboration with actuarial, underwriting, claims, legal, and finance departments and culminates with the input of reserve committees. Each business unit reserve committee includes the participation of the relevant parties from actuarial, finance, claims, and unit senior management and has the responsibility for finalizing, recommending and approving the estimate to be used as management's best estimate. Reserves are further reviewed by Chubb's Chief Actuary and senior management. The objective of such a process is to determine a single estimate that we believe represents a better estimate than any other and which is viewed by management to be the best estimate of ultimate loss settlements.

This estimate is based on a combination of exposure and experience-based actuarial methods (described below) and other considerations such as claims reviews, reinsurance recovery assumptions and/or input from other knowledgeable parties such as underwriting. Exposure-based methods are most commonly used on relatively immature origin years (i.e., the year in which the losses were incurred — "accident year" or "report year"), while experience-based methods provide a view based on the projection of loss experience that has emerged as of the valuation date. Greater reliance is placed upon experience-based methods as the pool of emerging loss experience grows and where it is deemed sufficiently credible and reliable as the basis for the estimate. In comparing the held reserve for any given origin year to the actuarial projections, judgment is required as to the credibility, uncertainty and inherent limitations of applying actuarial techniques to historical data to project future loss experience. Examples of factors that impact such judgments include, but are not limited to, the following:

- nature and complexity of underlying coverage provided and net limits of exposure provided;
- segmentation of data to provide sufficient homogeneity and credibility for loss projection methods;
- extent of credible internal historical loss data and reliance upon industry information as required;
- historical variability of actual loss emergence compared with expected loss emergence;
- reported and projected loss trends;
- extent of emerged loss experience relative to the remaining expected period of loss emergence;
- rate monitor information for new and renewal business;
- changes in claims handling practice;
- inflation;
- the legal environment;
- facts and circumstances of large claims;
- terms and conditions of the contracts sold to our insured parties;
- impact of applicable reinsurance recoveries; and
- nature and extent of underlying assumptions.

We have actuarial staff within each of our business units who analyze loss reserves (including loss expenses) and regularly project estimates of ultimate losses and the corresponding indications of the required IBNR reserve. Our reserving approach is a comprehensive ground-up process using data at a detailed level that reflects the specific types and coverages of the diverse products written by our various operations. The data presented in this disclosure was prepared on a more aggregated basis and with a focus on changes in incurred loss estimates over time as well as associated cash flows. We note that data prepared on this basis may not demonstrate the full spectrum of characteristics that are evident in the more detailed level studied internally.

We perform an actuarial reserve review for each product line at least once a year. For most product lines, one or more standard actuarial reserving methods may be used to determine estimates of ultimate losses and loss expenses, and from these estimates, a single actuarial central estimate is selected. The actuarial central estimate is an input to the reserve committee process described above. For the few product lines that do not lend themselves to standard actuarial reserving methods, appropriate techniques are applied to produce the actuarial central estimates. For example, run-off asbestos and environmental liability estimates are better suited to the application of account-specific exposure-based analyses to best evaluate their associated aggregate reserve levels.

b) Standard actuarial reserving methods
The judgments involved in projecting the ultimate losses include the use and interpretation of various standard actuarial reserving methods that place reliance on the extrapolation of actual historical data, loss development patterns, industry data, and other benchmarks as appropriate.

Standard actuarial reserving methods include, but are not limited to, expected loss ratio, paid and reported loss development, and Bornhuetter-Ferguson methods. A general description of these methods is provided below. In addition to these standard methods, depending upon the product line characteristics and available data, we may use other recognized actuarial methods and approaches. Implicit in the standard actuarial methods that we generally utilize is the need for two fundamental assumptions: first, the pattern by which losses are expected to emerge over time for each origin year, and second the expected loss ratio for each origin year.

The expected loss ratio for any particular origin year is selected after consideration of a number of factors, including historical loss ratios adjusted for rate changes, premium and loss trends, industry benchmarks, the results of policy level loss modeling at the time of underwriting, and/or other more subjective considerations for the product line (e.g., terms and conditions) and external environment as noted above. The expected loss ratio for a given origin year is initially established at the start of the origin year as part of the planning process. This analysis is performed in conjunction with underwriters and management. The expected loss ratio method arrives at an ultimate loss estimate by multiplying the expected ultimate loss ratio by the corresponding premium base. This method is most commonly used as the basis for the actuarial central estimate for immature origin periods on product lines where the actual paid or reported loss experience is not yet deemed sufficiently credible to serve as the principal basis for the selection of ultimate losses. The expected loss ratio for a given origin year may be modified over time if the underlying assumptions differ from the original assumptions (e.g., the assessment of prior year loss ratios, loss trend, rate changes, actual claims, or other information).

Our selected paid and reported development patterns provide a benchmark against which the actual emerging loss experience can be monitored. Where possible, development patterns are selected based on historical loss emergence by origin year. For product lines where the historical data is viewed to have low statistical credibility, the selected development patterns also reflect relevant industry benchmarks and/or experience from similar product lines written elsewhere within Chubb. This most commonly occurs for relatively new product lines that have limited historical data or for high severity/low frequency portfolios where our historical experience exhibits considerable volatility and/or lacks credibility. The paid and reported loss development methods convert the selected loss emergence pattern to a set of multiplicative factors which are then applied to actual paid or reported losses to arrive at an estimate of ultimate losses for each period. Due to their multiplicative nature, the paid and reported loss development methods will leverage differences between actual and expected loss emergence. These methods tend to be utilized for more mature origin periods and for those portfolios where the loss emergence has been relatively consistent over time.

The Bornhuetter-Ferguson method is a combination of the expected loss ratio method and the loss development method, where the loss development method is given more weight as the origin year matures. This approach allows a logical transition between the expected loss ratio method which is generally utilized at earlier maturities and the loss development methods which are typically utilized at later maturities. We usually apply this method using reported loss data although paid data may also be used.

Short-tail business
Short-tail business generally describes product lines for which losses are typically known and paid shortly after the loss actually occurs. This would include, for example, most property, personal accident, and automobile physical damage policies that we write. Due to the short reporting and development pattern for these product lines, the uncertainty associated with our estimate of ultimate losses for any particular accident period diminishes relatively quickly as actual loss experience emerges. We typically assign credibility to methods that incorporate actual loss emergence, such as the paid and reported loss development and Bornhuetter-Ferguson methods, sooner than would be the case for long-tail lines at a similar stage of development for a given origin year. The reserving process for short-tail losses arising from catastrophic events typically involves an assessment by the claims department, in conjunction with underwriters and actuaries, of our exposure and estimated losses immediately following an event and then subsequent revisions of the estimated losses as our insureds provide updated actual loss information.

Long-tail business
Long-tail business describes lines of business for which specific losses may not be known/reported for some period and for which claims can take significant time to settle/close. This includes most casualty lines such as general liability, D&O, and workers' compensation. There are various factors contributing to the uncertainty and volatility of long-tail business. Among these are:

- The nature and complexity of underlying coverage provided and net limits of exposure provided;
- Our historical loss data and experience is sometimes too immature and lacking in credibility to rely upon for reserving purposes. Where this is the case, in our reserve analysis we may utilize industry loss ratios or industry benchmark development patterns that we believe reflect the nature and coverage of the underwritten business and its future development, where available. For such product lines, actual loss experience may differ from industry loss statistics as well as loss experience for previous underwriting years;
- The difficulty in estimating loss trends, claims inflation (e.g., medical and judicial) and underlying economic conditions;
- The need for professional judgment to estimate loss development patterns beyond that represented by historical data using supplemental internal or industry data, extrapolation, or a blend of both;
- The need to address shifts in business mix or volume over time when applying historical paid and reported loss development patterns from older origin years to more recent origin years. For example, changes over time in the processes and procedures for establishing case reserves can distort reported loss development patterns or changes in ceded reinsurance structures by origin year can alter the development of paid and reported losses;
- Loss reserve analyses typically require loss or other data be grouped by common characteristics in some manner. If data from two combined lines of business exhibit different characteristics, such as loss payment patterns, the credibility of the reserve estimate could be affected. Additionally, since casualty lines of business can have significant intricacies in the terms and conditions afforded to the insured, there is an inherent risk as to the homogeneity of the underlying data used in performing reserve analyses; and
- The applicability of the price change data used to estimate ultimate loss ratios for most recent origin years.

As described above, various factors are considered when determining appropriate data, assumptions, and methods used to establish the loss reserve estimates for long-tail product lines. These factors may also vary by origin year for given product lines. The derivation of loss development patterns from data and the selection of a tail factor to project ultimate losses from actual loss emergence require considerable judgment, particularly with respect to the extent to which historical loss experience is relied upon to support changes in key reserving assumptions.

c) Loss Development Tables
The tables were designed to present business with similar risk characteristics which exhibit like development patterns and generally similar trends, in order to provide insight into the nature, amount, timing and uncertainty of cash flows related to our claims liabilities.

Each table follows a similar format and reflects the following:

- The incurred loss triangle includes both reported case reserves and IBNR liabilities.
- Both the incurred and paid loss triangles include allocated loss adjustment expense (i.e., defense and investigative costs particular to individual claims) but exclude unallocated loss adjustment expense (i.e., the costs associated with internal claims staff and third-party administrators).
- The amounts in both triangles for the years ended December 31, 2010, to December 31, 2018 and average historical claim duration as of December 31, 2019, are presented as supplementary information.

- All data presented in the triangles is net of reinsurance recoverables.
- The IBNR reserves shown to the right of each incurred loss development exhibit reflect the net IBNR recorded as of December 31, 2019.
- The tables are presented retrospectively with respect to acquisitions where these are material and doing so is practicable. Most notably, the Chubb Corp acquisition is presented retrospectively. The unaudited consolidated data is presented solely for informational purposes and is not necessarily indicative of the consolidated data that might have been observed had the transactions been completed prior to the date indicated.

Historical dollar amounts are presented in this footnote on a constant-dollar basis, which is achieved by assuming constant foreign exchange rates for all periods in the loss triangles, translating prior period amounts using the same local currency exchange rates as the current year end. The impact of this conversion is to show the change between periods exclusive of the effect of fluctuations in exchange rates, which would otherwise distort the change in incurred loss and cash flow patterns shown. The change in incurred loss shown will differ from other GAAP disclosures of incurred prior period reserve development amounts, which include the effect of fluctuations in exchanges rates.

We provided guidance above on key assumptions that should be considered when reviewing this disclosure and information relating to how loss reserve estimates are developed. We believe the information provided in the “Loss Development Tables” section of the disclosure is of limited use for independent analysis or application of standard actuarial estimations.

Cumulative Number of Reported Claims
Reported claim counts, on a cumulative basis, are provided to the far right of each incurred loss development table. We generally consider a reported claim to be one claim per coverage per claimant. We exclude claims closed without payment. Use of the presented claim counts in analysis of company experience has significant limitations, including:

- High deductible workers' compensation claim counts include claims below the applicable policy deductible.
- Professional liability and certain other lines have a high proportion of claims reported which will be closed without any payment; shifts in total reported counts may not meaningfully impact reported and ultimate loss experience.
- Claims for certain events and/or product lines, such as portions of assumed reinsurance and A&H business, are not reported on an individual basis, but rather in bulk and thus not available for inclusion in this disclosure.
- Each of the segments below typically has a mixture of primary and excess experience which has shifted over time.

Reported claim counts include open claims which have case reserves and exclude claims that have been incurred but not reported. As such the reported claims are consistent with reported losses, which can be calculated by subtracting incurred but not reported losses from incurred losses. Reported claim counts are inconsistent with losses in the incurred loss triangle, which include incurred but not reported losses, and are also inconsistent with losses in the paid loss triangle, which exclude case reserves.

North America Commercial P&C Insurance — Workers' Compensation — Long-tail
This product line has a substantial geographic spread and a broad mix across industries. Types of coverage include risk management business predominantly with high deductible policies, loss sensitive business (i.e., retrospectively-rated policies), business fronted for captives, as well as excess and primary guaranteed cost coverages.

The triangle below shows all loss and allocated expense development for the workers' compensation product line. In our prior period development disclosure, we exclude any loss development where there is a directly related premium adjustment. For workers' compensation, changes in the exposure base due to payroll audits will drive changes in ultimate losses. In addition, we record involuntary pool assumptions (premiums and losses) on a lagged basis. Both of these items will influence the development in the triangle, particularly the first prior accident year, and are included in the reconciliation table presented on page F-60.

North America Commercial P&C Insurance — Workers' Compensation — Long-tail (continued)
Net Incurred Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31										As of December 31 2019	
	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 1,049	$ 1,037	$ 1,050	$ 1,065	$ 1,064	$ 1,052	$ 1,028	$ 1,020	$ 1,018	**$ 999**	**$ 223**	**303**
2011		1,037	1,030	1,046	1,049	1,053	1,022	1,012	1,009	**988**	**233**	**286**
2012			1,050	1,011	1,030	1,040	1,011	989	986	**977**	**275**	**287**
2013				1,109	1,108	1,122	1,127	1,086	1,073	**1,037**	**309**	**299**
2014					1,207	1,201	1,217	1,215	1,163	**1,100**	**395**	**336**
2015						1,282	1,259	1,276	1,279	**1,217**	**500**	**334**
2016							1,366	1,361	1,383	**1,378**	**673**	**304**
2017								1,412	1,380	**1,399**	**783**	**339**
2018									1,359	**1,360**	**788**	**362**
2019										**1,391**	**997**	**246**
Total										**$ 11,846**		

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31									
	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 123	$ 300	$ 411	$ 493	$ 551	$ 592	$ 617	$ 641	$ 666	**$ 684**
2011		119	294	411	484	533	567	595	616	**640**
2012			111	271	365	436	486	532	574	**592**
2013				107	286	422	506	553	587	**616**
2014					113	295	410	484	532	**566**
2015						116	301	418	501	**564**
2016							122	326	452	**529**
2017								120	313	**437**
2018									130	**329**
2019										**143**
Total										**$ 5,100**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 2,668**
All Accident years	**$ 9,414**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ (93)**
All Accident years	**$ (288)**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	10%	16%	10%	7%	5%	4%	3%	2%	2%	2%

North America Commercial P&C Insurance — Liability — Long-tail
This line consists of primary and excess liability exposures, including medical liability and professional lines, including directors and officers (D&O) liability, errors and omissions (E&O) liability, employment practices liability (EPL), fidelity bonds, and fiduciary liability.

The primary and excess liability business represents the largest part of these exposures. The former includes both monoline and commercial package liability. The latter includes a substantial proportion of commercial umbrella, excess and high excess business, where loss activity can produce significant volatility in the loss triangles at later ages within an accident year (and sometimes across years) due to the size of the limits afforded and the complex nature of the underlying losses.

This line includes management and professional liability products provided to a wide variety of clients, from national accounts to small firms along with private and not-for-profit organizations, distributed through brokers, agents, wholesalers and MGAs. Many of these coverages, particularly D&O and E&O, are typically written on a claims-made form. While most of the coverages are underwritten on a primary basis, there are significant amounts of excess exposure with large policy limits.

Net Incurred Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31										As of December 31 2019	
(in millions of U.S. dollars)	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 3,574	$ 3,579	$ 3,597	$ 3,556	$ 3,416	$ 3,247	$ 3,125	$ 3,105	$ 2,993	**$ 2,983**	**$ 202**	**18**
2011		3,496	3,582	3,626	3,660	3,590	3,494	3,380	3,312	**3,190**	**299**	**18**
2012			3,548	3,624	3,609	3,560	3,520	3,422	3,326	**3,231**	**430**	**18**
2013				3,543	3,538	3,538	3,528	3,426	3,212	**3,118**	**500**	**17**
2014					3,532	3,582	3,671	3,713	3,652	**3,467**	**792**	**17**
2015						3,556	3,705	3,814	3,971	**3,939**	**1,232**	**19**
2016							3,530	3,591	3,688	**3,801**	**1,279**	**20**
2017								3,319	3,495	**3,577**	**1,818**	**21**
2018									3,371	**3,490**	**2,170**	**24**
2019										**3,449**	**3,005**	**25**
Total										**$ 34,245**		

North America Commercial P&C Insurance — Liability — Long-tail (continued)

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31									
(in millions of U.S. dollars)	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 126	$ 611	$ 1,108	$ 1,558	$ 1,892	$ 2,257	$ 2,424	$ 2,525	$ 2,659	**$ 2,716**
2011		160	651	1,208	1,803	2,212	2,474	2,657	2,738	**2,824**
2012			166	655	1,171	1,678	2,090	2,324	2,499	**2,615**
2013				130	547	1,191	1,595	2,005	2,230	**2,371**
2014					164	679	1,249	1,802	2,200	**2,440**
2015						138	605	1,205	1,854	**2,289**
2016							171	662	1,335	**1,974**
2017								161	616	**1,161**
2018									189	**754**
2019										**176**
Total										**$ 19,320**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 1,522**
All Accident years	**$ 16,447**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ (49)**
All Accident years	**$ (273)**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	5%	14%	17%	16%	12%	8%	5%	3%	4%	2%

North America Commercial P&C Insurance — Other Casualty — Long-tail
This product line consists of the remaining commercial casualty coverages such as automobile liability and aviation. There is also a small portion of commercial multi-peril (CMP) business in accident years 2014 and prior. The paid and reported data are impacted by some catastrophe loss activity primarily on the CMP exposures just noted.

North America Commercial P&C Insurance — Other-Casualty — Long-tail (continued)

Net Incurred Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31										As of December 31 2019	
(in millions of U.S. dollars)	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 613	$ 607	$ 601	$ 546	$ 506	$ 478	$ 480	$ 493	$ 484	**$ 481**	**$ 16**	**15**
2011		580	589	581	548	533	524	516	510	**512**	**24**	**15**
2012			633	605	577	560	520	519	508	**507**	**3**	**15**
2013				526	530	522	515	468	462	**461**	**29**	**17**
2014					594	583	581	596	555	**538**	**45**	**17**
2015						486	470	501	515	**458**	**51**	**15**
2016							504	502	527	**524**	**136**	**15**
2017								531	566	**577**	**174**	**16**
2018									535	**563**	**298**	**15**
2019										**606**	**428**	**14**
Total										**$ 5,227**		

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31									
(in millions of U.S. dollars)	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 97	$ 236	$ 322	$ 363	$ 392	$ 433	$ 443	$ 449	$ 453	**$ 452**
2011		86	235	341	400	437	461	466	480	**486**
2012			69	222	319	386	435	470	486	**493**
2013				69	197	270	348	385	411	**418**
2014					80	220	317	391	454	**473**
2015						47	137	214	304	**370**
2016							52	145	246	**323**
2017								66	175	**312**
2018									74	**169**
2019										**70**
Total										**$ 3,566**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 252**
All Accident years	**$ 1,913**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 5**
All Accident years	**$ (36)**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	14%	24%	19%	14%	9%	6%	2%	2%	1%	—%

North America Commercial P&C Insurance — Non-Casualty — Short-tail
This product line represents first party commercial product lines that are short-tailed in nature, such as property, inland marine, ocean marine, surety and A&H. There is a wide diversity of products, primary and excess coverages, and policy sizes. During this ten-year period, this product line was also impacted by natural catastrophes mainly in the 2012, 2017, and 2018 accident years.

Net Incurred Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31										As of December 31 2019	
	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 1,501	$ 1,537	$ 1,461	$ 1,424	$ 1,422	$ 1,415	$ 1,410	$ 1,404	$ 1,394	**$ 1,394**	**$ 1**	**1,057**
2011		1,958	1,932	1,875	1,853	1,833	1,837	1,832	1,832	**1,833**	**10**	**1,051**
2012			2,030	1,913	1,880	1,861	1,856	1,844	1,841	**1,847**	**3**	**1,035**
2013				1,430	1,420	1,333	1,356	1,337	1,337	**1,334**	**3**	**1,072**
2014					1,642	1,658	1,576	1,555	1,546	**1,547**	**7**	**1,100**
2015						1,733	1,742	1,647	1,635	**1,602**	**17**	**1,170**
2016							1,907	1,887	1,797	**1,778**	**16**	**1,291**
2017								2,701	2,605	**2,503**	**71**	**1,374**
2018									2,050	**2,237**	**182**	**1,551**
2019										**2,049**	**587**	**1,446**
Total										**$ 18,124**		

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31									
	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 723	$ 1,222	$ 1,320	$ 1,357	$ 1,382	$ 1,391	$ 1,394	$ 1,395	$ 1,391	**$ 1,391**
2011		938	1,571	1,715	1,775	1,785	1,808	1,813	1,819	**1,822**
2012			713	1,575	1,696	1,764	1,792	1,819	1,813	**1,839**
2013				649	1,135	1,234	1,282	1,308	1,321	**1,329**
2014					818	1,370	1,481	1,502	1,528	**1,543**
2015						725	1,341	1,486	1,554	**1,570**
2016							845	1,502	1,653	**1,729**
2017								978	2,085	**2,301**
2018									1,026	**1,823**
2019										**1,029**
Total										**$ 16,376**

North America Commercial P&C Insurance — Non-Casualty — Short-tail (continued)

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)		December 31, 2019
Accident years prior to 2010	$	11
All Accident years	$	1,759

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)		December 31, 2019
Accident years prior to 2010	$	(6)
All Accident years	$	32

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	47%	39%	8%	3%	1%	1%	—%	1%	—%	—%

North America Personal P&C Insurance — Short-tail

Chubb provides personal lines coverages for high-net-worth individuals and families in North America including homeowners, automobile, valuable articles (including fine art), umbrella liability, and recreational marine insurance offered through independent regional agents and brokers. A portfolio acquired from Fireman's Fund is presented on a prospective basis beginning in May of accident year 2015. Reserves associated with prior accident periods were acquired through a loss portfolio transfer, which does not allow for a retrospective presentation. During this ten-year period, this segment was also impacted by natural catastrophes, mainly in 2012, 2017 and 2018 accident years.

Net Incurred Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31										As of December 31 2019	
(in millions of U.S. dollars)	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 1,868	$ 1,876	$ 1,853	$ 1,835	$ 1,832	$ 1,828	$ 1,823	$ 1,820	$ 1,821	**$ 1,820**	**$ 6**	**146**
2011		2,205	2,207	2,182	2,170	2,162	2,158	2,157	2,156	**2,156**	**8**	**166**
2012			2,183	2,181	2,181	2,189	2,183	2,184	2,186	**2,192**	**20**	**170**
2013				1,854	1,882	1,890	1,894	1,918	1,931	**1,938**	**26**	**122**
2014					2,202	2,203	2,189	2,142	2,156	**2,143**	**19**	**132**
2015						2,491	2,546	2,557	2,540	**2,559**	**30**	**135**
2016							2,436	2,532	2,541	**2,479**	**78**	**138**
2017								3,031	3,066	**2,998**	**171**	**142**
2018									3,006	**3,033**	**295**	**148**
2019										**2,953**	**725**	**116**
Total										**$ 24,271**		

North America Personal P&C Insurance — Short-tail (continued)
Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

										Years Ended December 31
(in millions of U.S. dollars)									Unaudited	
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 1,151	$ 1,521	$ 1,668	$ 1,727	$ 1,770	$ 1,791	$ 1,803	$ 1,809	$ 1,810	**$ 1,812**
2011		1,358	1,833	1,969	2,049	2,103	2,126	2,136	2,143	**2,146**
2012			1,175	1,804	1,955	2,061	2,115	2,147	2,161	**2,161**
2013				1,040	1,499	1,682	1,781	1,837	1,879	**1,890**
2014					1,308	1,762	1,922	2,031	2,076	**2,103**
2015						1,497	2,081	2,267	2,388	**2,475**
2016							1,451	2,049	2,208	**2,311**
2017								1,696	2,517	**2,664**
2018									1,924	**2,545**
2019										**1,666**
Total										**$ 21,773**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 27**
All Accident years	**$ 2,525**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ (1)**
All Accident years	**$ (86)**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	59%	23%	7%	4%	3%	1%	1%	—%	—%	—%

Overseas General Insurance — Casualty — Long-tail
This product line is comprised of D&O liability, E&O liability, financial institutions (including crime/fidelity coverages), and non-U.S. general liability as well as aviation and political risk. Exposures are located around the world, including Europe, Latin America, and Asia. Approximately 45 percent of Chubb Overseas General business is generated by European accounts, exclusive of Lloyd's market. There is some U.S. exposure in Casualty from multinational accounts and in financial lines for Lloyd's market. The financial lines coverages are typically written on a claims-made form, while general liability coverages are typically on an occurrence basis and comprised of a mix of primary and excess businesses.

Overseas General Insurance — Casualty — Long-tail (continued)

Net Incurred Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31										As of December 31 2019	
	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 1,183	$ 1,263	$ 1,308	$ 1,379	$ 1,316	$ 1,265	$ 1,141	$ 1,136	$ 1,142	**$ 1,149**	**$ 68**	**37**
2011		1,211	1,218	1,210	1,200	1,117	1,054	1,042	991	**988**	**35**	**37**
2012			1,246	1,217	1,279	1,297	1,294	1,285	1,265	**1,255**	**137**	**38**
2013				1,237	1,233	1,229	1,272	1,226	1,193	**1,136**	**139**	**38**
2014					1,238	1,308	1,317	1,333	1,249	**1,167**	**208**	**39**
2015						1,164	1,259	1,288	1,311	**1,286**	**287**	**41**
2016							1,191	1,291	1,357	**1,385**	**428**	**42**
2017								1,185	1,286	**1,335**	**495**	**41**
2018									1,283	**1,333**	**789**	**40**
2019										**1,346**	**1,011**	**32**
Total										**$ 12,380**		

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31									
	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 102	$ 265	$ 462	$ 605	$ 712	$ 801	$ 850	$ 903	$ 946	**$ 983**
2011		87	240	384	513	612	691	764	815	**848**
2012			74	245	428	577	689	826	897	**939**
2013				85	261	414	558	699	798	**865**
2014					111	287	461	591	704	**786**
2015						86	281	484	661	**780**
2016							123	316	520	**667**
2017								96	314	**520**
2018									109	**325**
2019										**122**
Total										**$ 6,835**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 432**
All Accident years	**$ 5,977**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ (18)**
All Accident years	**$ (61)**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	8%	15%	15%	12%	10%	9%	6%	4%	4%	3%

Overseas General Insurance — Non-Casualty — Short-tail
This product line is comprised of commercial fire, marine (predominantly cargo), surety, personal automobile (in Latin America, Asia Pacific and Japan), personal cell phones, personal residential (including high net worth), energy and construction. In general, these lines have relatively stable payment and reporting patterns although they are impacted by natural catastrophes mainly in the 2010, 2011, 2017, and 2018 accident years. Latin America and Europe each make up about 30 percent of the Chubb Overseas General non-casualty book.

Net Incurred Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31										As of December 31 2019	
	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 1,647	$ 1,669	$ 1,643	$ 1,632	$ 1,626	$ 1,612	$ 1,599	$ 1,582	$ 1,584	**$ 1,582**	**$ 6**	**518**
2011		1,871	1,956	1,900	1,861	1,843	1,832	1,824	1,814	**1,810**	**3**	**544**
2012			1,696	1,686	1,646	1,591	1,585	1,577	1,561	**1,556**	**14**	**556**
2013				1,778	1,770	1,703	1,656	1,651	1,621	**1,609**	**27**	**574**
2014					1,852	1,920	1,862	1,851	1,814	**1,804**	**15**	**549**
2015						1,952	2,075	2,051	2,017	**1,999**	**38**	**571**
2016							2,050	2,052	2,040	**2,018**	**17**	**567**
2017								2,198	2,238	**2,220**	**46**	**577**
2018									2,153	**2,244**	**124**	**622**
2019										**2,181**	**376**	**608**
Total										**$ 19,023**		

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31									
	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 671	$ 1,226	$ 1,424	$ 1,486	$ 1,524	$ 1,537	$ 1,544	$ 1,545	$ 1,550	**$ 1,562**
2011		758	1,460	1,660	1,716	1,746	1,761	1,769	1,773	**1,773**
2012			681	1,226	1,412	1,470	1,493	1,502	1,515	**1,517**
2013				698	1,273	1,466	1,497	1,534	1,553	**1,562**
2014					758	1,423	1,632	1,696	1,727	**1,741**
2015						852	1,546	1,778	1,858	**1,881**
2016							1,015	1,670	1,865	**1,938**
2017								1,046	1,830	**2,005**
2018									994	**1,726**
2019										**1,038**
Total										**$ 16,743**

Overseas General Insurance — Non-Casualty — Short-tail (continued)
Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)		December 31, 2019
Accident years prior to 2010	$	97
All Accident years	$	2,377

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)		December 31, 2019
Accident years prior to 2010	$	1
All Accident years	$	1

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	45%	35%	11%	3%	2%	1%	1%	—%	—%	1%

Global Reinsurance
Chubb analyzes its Global Reinsurance business on a treaty year basis rather than on an accident year basis. Treaty year data was converted to an accident year basis for the purposes of this disclosure. Mix shifts are an important consideration in these product line groupings. As proportional business and excess of loss business have different earning and loss reporting and payment patterns, this change in mix will affect the cash flow patterns across the accident years. In addition, the shift from excess to proportional business over time will make the cash flow patterns of older and more recent years difficult to compare. In general, the proportional business will pay out more quickly than the excess of loss business, as such, using older years development patterns may overstate the ultimate loss estimates in more recent years.

Global Reinsurance — Casualty — Long-tail
This product line includes proportional and excess coverages in general, automobile liability, professional liability, medical malpractice, workers' compensation and aviation, with exposures located around the world. In general, reinsurance exhibits less stable development patterns than primary business. In particular, general casualty reinsurance and excess coverages are long-tailed and can be very volatile.

Net Incurred Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31										As of December 31 2019	
(in millions of U.S. dollars)	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 399	$ 419	$ 430	$ 441	$ 430	$ 424	$ 414	$ 400	$ 387	**$ 373**	**$ 23**	**0.802**
2011		407	414	428	432	427	417	413	407	**401**	**27**	**0.659**
2012			385	382	390	393	378	371	370	**372**	**10**	**0.457**
2013				320	326	328	329	330	323	**316**	**20**	**0.341**
2014					332	333	338	341	343	**346**	**39**	**0.382**
2015						284	288	299	300	**308**	**33**	**0.298**
2016							222	226	234	**233**	**30**	**0.341**
2017								213	214	**219**	**45**	**0.529**
2018									244	**246**	**65**	**0.589**
2019										**238**	**130**	**0.219**
Total										**$ 3,052**		

Global Reinsurance — Casualty — Long-tail (continued)

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

	Years Ended December 31									
(in millions of U.S. dollars)	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 56	$ 125	$ 179	$ 220	$ 249	$ 274	$ 291	$ 306	$ 315	**$ 320**
2011		70	146	195	236	267	291	311	324	**331**
2012			77	167	221	260	292	307	322	**334**
2013				65	143	186	222	241	259	**268**
2014					91	184	217	248	264	**276**
2015						90	159	191	217	**232**
2016							57	113	142	**159**
2017								46	100	**122**
2018									41	**96**
2019										**40**
Total										**$ 2,178**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 303**
All Accident years	**$ 1,177**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ (50)**
All Accident years	**$ (58)**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	21%	23%	12%	10%	7%	5%	4%	4%	2%	2%

Global Reinsurance — Non-Casualty — Short-tail

This product line includes property, property catastrophe, marine, credit/surety, A&H and energy. This product line is impacted by natural catastrophes, particularly in the 2011, 2017 and 2018 accident years. Of the non-catastrophe book, the mixture of business varies by year with approximately 73 percent of loss on proportional treaties in treaty year 2010 and after. This percentage has increased over time with the proportion being approximately 58 percent for treaty years 2010 to 2012 growing to an average of 80 percent for treaty years 2013 to 2019, with the remainder being written on an excess of loss basis.

Global Reinsurance — Non-Casualty — Short-tail (continued)

Net Incurred Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31										As of December 31 2019	
	Unaudited											
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**Net IBNR Reserves**	**Reported Claims** (in thousands)
2010	$ 194	$ 228	$ 218	$ 212	$ 216	$ 218	$ 218	$ 219	$ 218	**$ 217**	**$ —**	**0.102**
2011		269	270	268	258	258	260	259	259	**259**	**1**	**0.132**
2012			230	210	200	191	189	187	184	**184**	**1**	**0.113**
2013				161	159	147	142	143	140	**140**	**—**	**0.121**
2014					164	180	180	183	181	**180**	**3**	**0.101**
2015						146	154	161	161	**153**	**3**	**0.115**
2016							180	186	188	**190**	**12**	**0.182**
2017								396	423	**453**	**10**	**0.309**
2018									285	**297**	**(6)**	**0.212**
2019										**141**	**73**	**0.032**
Total										**$ 2,214**		

Net Cumulative Paid Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	Years Ended December 31									
	Unaudited									
Accident Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**
2010	$ 55	$ 156	$ 182	$ 193	$ 199	$ 209	$ 207	$ 210	$ 210	**$ 214**
2011		85	174	204	228	246	251	253	254	**256**
2012			45	130	156	166	172	177	179	**180**
2013				46	102	120	129	132	135	**135**
2014					65	129	152	163	169	**171**
2015						56	103	132	142	**146**
2016							56	131	158	**169**
2017								191	322	**402**
2018									94	**257**
2019										**35**
Total										**$ 1,965**

Net Liabilities for Loss and Allocated Loss Adjustment Expenses

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ 6**
All Accident years	**$ 255**

Supplementary Information: (Favorable)/ Adverse Prior Period Development

(in millions of U.S. dollars)	**December 31, 2019**
Accident years prior to 2010	**$ (4)**
All Accident years	**$ 30**

Supplementary Information: Average Annual Percentage Payout of Net Incurred Claims by Age, as of December 31, 2019 (Unaudited)

Age in Years	1	2	3	4	5	6	7	8	9	10
Percentage	33%	36%	15%	6%	3%	2%	1%	1%	—%	—%

Prior Period Development — Supplementary Information

The following table presents a reconciliation of the loss development triangles above to prior period development:

	Components of PPD					
Year Ended December 31, 2019 (in millions of U.S. dollars) (favorable)/unfavorable	2010 - 2018 accident years (implied PPD per loss triangles)	Accident years prior to 2010	Other (1)	PPD on loss reserves	RIPs, Expense adjustments, and earned premiums	Total
North America Commercial P&C Insurance						
Long-tail	$ (460)	$ (137)	$ (110)	$ (707)	$ 39	$ (668)
Short-tail	38	(6)	(8)	24	(5)	19
	(422)	(143)	(118) (2)	(683)	34	(649)
North America Personal P&C Insurance (Short-tail)	(85)	(1)	(5)	(91)	(4)	(95)
Overseas General Insurance						
Long-tail	(43)	(18)	(7)	(68)	—	(68)
Short-tail	—	1	(26)	(25)	1	(24)
	(43)	(17)	(33) (3)	(93)	1	(92)
Global Reinsurance						
Long-tail	(8)	(50)	(1)	(59)	—	(59)
Short-tail	34	(4)	1	31	(1)	30
	26	(54)	—	(28)	(1)	(29)
Subtotal	$ (524)	$ (215)	$ (156)	$ (895)	$ 30	$ (865)
North America Agricultural Insurance (Short-tail)				$ (103)	$ 23	$ (80)
Corporate (Long-tail)				153	—	153
Consolidated PPD				$ (845)	$ 53	$ (792)

(1) Other includes the impact of foreign exchange.

(2) Includes favorable development of $82 million related to our Alternative Risk Solutions business (U.S. and Bermuda) and an adjustment to exclude $22 million in unfavorable development in the workers' compensation line, associated with an increase in exposure for which additional premiums were collected; the remaining difference relates to a number of other items, none of which are individually material.

(3) Includes favorable development of $37 million related to International A&H business; the remaining difference relates to a number of other items, none of which are individually material.

Prior Period Development

Prior period development arises from changes to loss estimates recognized in the current year that relate to loss events that occurred in previous calendar years and excludes the effect of losses from the development of earned premium from previous accident years. Long-tail lines include lines such as workers' compensation, general liability, and professional liability; while short-tail lines include lines such as most property lines, energy, personal accident, and agriculture. The following table summarizes (favorable) and adverse prior period development (PPD) by segment:

Years Ended December 31 (in millions of U.S. dollars, except for percentages)	Long-tail	Short-tail	Total	% of beginning net unpaid reserves (1)
2019				
North America Commercial P&C Insurance	**$ (668)**	**$ 19**	**$ (649)**	**1.3%**
North America Personal P&C Insurance	**—**	**(95)**	**(95)**	**0.2%**
North America Agricultural Insurance	**—**	**(80)**	**(80)**	**0.2%**
Overseas General Insurance	**(68)**	**(24)**	**(92)**	**0.2%**
Global Reinsurance	**(59)**	**30**	**(29)**	**0.1%**
Corporate	**153**	**—**	**153**	**0.3%**
Total	**$ (642)**	**$ (150)**	**$ (792)**	**1.6%**
2018				
North America Commercial P&C Insurance	$ (395)	$ (215)	$ (610)	1.2%
North America Personal P&C Insurance	—	41	41	0.1%
North America Agricultural Insurance	—	(110)	(110)	0.2%
Overseas General Insurance	(67)	(145)	(212)	0.4%
Global Reinsurance	(69)	19	(50)	0.1%
Corporate	45	—	45	0.1%
Total	$ (486)	$ (410)	$ (896)	1.8%
2017				
North America Commercial P&C Insurance	$ (562)	$ (184)	$ (746)	1.6%
North America Personal P&C Insurance	—	69	69	0.1%
North America Agricultural Insurance	—	(119)	(119)	0.2%
Overseas General Insurance	(71)	(181)	(252)	0.5%
Global Reinsurance	(68)	9	(59)	0.1%
Corporate	278	—	278	0.6%
Total	$ (423)	$ (406)	$ (829)	1.7%

(1) Calculated based on the beginning of period consolidated net unpaid losses and loss expenses.

Significant prior period movements by segment, principally driven by reserve reviews completed during each respective period, are discussed in more detail below. The remaining net development for long-tail lines and short-tail business for each segment and Corporate comprises numerous favorable and adverse movements across a number of lines and accident years, none of which is significant individually or in the aggregate.

North America Commercial P&C Insurance
2019
North America Commercial P&C Insurance experienced net favorable PPD of $649 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable development of $668 million in long-tail business, primarily from:
  - Net favorable development of $303 million in workers' compensation lines. This included favorable development of $61 million related to our annual assessment of multi-claimant events including industrial accidents, in the 2018 accident year. Consistent with prior years, we reviewed these potential exposures after the close of the accident year to allow for late reporting or identification of significant losses. This development in accident year 2018 was partially offset by some higher than expected activity from other claims and from involuntary pools. The remaining overall

favorable development was mainly in accident years 2015 and prior, generally driven by lower than expected loss experience and related updates to loss development factors;

- Net favorable development of $217 million in management liability portfolios, favorably impacting accident years 2015 and prior where paid and reported loss activity was lower than expected, partially offset by adverse development in the 2016 through 2018 accident years, mostly as a result of higher severity claim costs compared to prior expectations in certain lines or coverages, particularly in our Directors and Officers (D&O) portfolios;
- Net favorable development of $60 million in professional liability (errors & omissions and cyber), mainly in the 2015 and prior accident years where case activity was less than expected, partially offset by adverse development in the 2016 accident year, which was driven by several large adverse claim developments;
- Net favorable development of $41 million in commercial excess and umbrella portfolios, mainly in accident years 2013 and prior, driven by lower paid and reported loss activity relative to prior expectations as well as an increase in weighting towards experience-based methods, partly offset by modestly adverse development in more recent accident years, mainly in 2017 and 2018, due to higher than expected large loss activity;
- Net favorable development of $39 million in foreign casualty business, impacting accident years 2015 and prior, driven by reported loss activity that was generally lower than expected;
- Net favorable development of $36 million on large multi-line prospective deals in the 2015 and prior accident years, due to lower than expected reported loss activity. These structured deals typically cover large clients for multiple product lines and with varying loss limitations; this development is net of premium returns of $34 million tied to the loss performance of the particular deals;
- Net favorable development of $24 million in medical and life sciences businesses, mainly impacting accident years 2015 and prior, primarily due to favorable reported experience and an increase in weighting towards experience-based methods;
- Favorable development of $23 million in political risk and trade credit portfolios, mainly impacting the 2015 accident year, primarily due to favorable reported experience and an increase in weighting towards experience-based methods;
- Net adverse development of $26 million mainly in products and general liability portfolios, including adverse movements within construction, partly offset by commercial-multi peril (CMP) liability, with older accident years generally experiencing favorable run-off, while more recent accident years developing adversely; and
- Net adverse development of $38 million in automobile liability, driven by adverse paid and reported loss experience mainly in accident years 2014 through 2018.

- Net adverse development of $19 million in short-tail business, primarily from:
    - Net adverse development, excluding catastrophes, of $108 million in property and marine portfolios with adverse development of $152 million across our retail, wholesale, and program distribution channels in accident year 2018, primarily due to a higher than expected severity of non-catastrophe claims, partly offset by favorable development of $44 million in 2017 and prior accident years on non-catastrophe claims;
    - Net favorable catastrophe development in property and marine portfolios of $36 million. There was $41 million of favorable development on the 2017 and 2018 natural catastrophes, mostly in 2017, partly offset by some adverse development on older catastrophe events; and
    - Favorable development of $49 million in surety businesses, mainly in accident year 2017, driven by lower than expected reported loss activity.

2018
North America Commercial P&C Insurance experienced net favorable PPD of $610 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable development of $395 million in long-tail business, primarily from:
  - Net favorable development of $199 million in our management liability portfolios, favorably impacting accident years 2013 and prior where paid and reported loss activity was lower than expected, partially offset by adverse development in the 2014 through 2017 accident years, mostly as a result of higher severity claim costs compared to prior expectations in certain lines or coverages, particularly in our Directors and Officers (D&O) portfolio;
  - Net favorable development of $194 million in workers' compensation lines with favorable development of $56 million in the 2017 accident year mainly related to our annual assessment of multi-claimant events including industrial accidents. Consistent with prior years, we reviewed these potential exposures after the close of the accident year to allow for late reporting or identification of significant losses. The net remaining favorable development of $138 million was principally due to lower than expected loss experience, mainly impacting accident years 2014 and prior;
  - Net favorable development of $100 million in our commercial excess and umbrella portfolios, primarily in accident years 2012 and prior. This was driven by lower than expected reported loss activity, and an increase in weighting towards experience-based methods, partly offset by higher than expected claim activity in the 2014, 2015 and 2017 accident years which led to reserve strengthening in those years;
  - Favorable development of $33 million in a runoff professional liability portfolio, impacting accident years 2002 and prior, owing mainly to the favorable disposition of a specific claim;
  - Net favorable development of $28 million in our foreign casualty lines, primarily impacting accident years 2014 and prior, driven by reported loss activity that was generally lower than expected;
  - Favorable development of $23 million in our political risk and trade credit portfolios, mainly impacting the 2014 accident year, primarily due to favorable reported experience and an increased in weighting towards experience-based methods;
  - Net adverse development of $91 million in our medical portfolios, mainly impacting accident years 2015, 2016 and 2017. The increase was driven by a combination of several large claims and generally higher than expected paid and reported case incurred activity; and
  - Net adverse development of $109 million, mainly in our automobile liability, commercial-multi peril (CMP) liability, products and general liability lines, driven by adverse paid and reported loss activity relative to prior expectations in accident years 2015 through 2017, partly offset by favorable emergence in older accident years.
- Net favorable development of $215 million in short-tail business, primarily from:
  - Net favorable development of $155 million in our commercial property and marine businesses due to favorable claim development, including $129 million net favorable development on the 2017 natural catastrophes; and
  - Net favorable development of $60 million in other short-tail business, including $19 million in surety and also including several smaller net favorable movements from lower than expected case activity in other classes, such as accident and commercial automobile physical damage, none of which were significant individually or in the aggregate.

2017
North America Commercial P&C Insurance experienced net favorable PPD of $746 million, representing 1.6 percent of the beginning consolidated net unpaid losses and loss expense reserves.

North America Personal P&C Insurance
2019
North America Personal P&C Insurance incurred net favorable PPD of $95 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable claim development of $132 million on the 2017 and 2018 natural catastrophes for all lines;
- Net favorable development of $26 million in our personal excess lines primarily impacting the 2016 accident year, due to lower than expected loss emergence and an increase in weighting towards experience-based methods, partly offset by adverse emergence in accident year 2015;
- Net favorable development of $16 million, which was the net result of several underlying favorable and adverse movements predominantly in the automobile and recreational marine lines; and
- Net adverse development of $82 million in our homeowners lines, including valuables, arising from non-catastrophe loss emergence, mainly in the 2018 accident year.

2018
North America Personal P&C Insurance incurred net adverse PPD of $41 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net adverse development of $63 million in our homeowners and valuables lines, primarily impacting the 2017 accident year. Overall, non-catastrophe losses were $136 million higher than expected, partially offset by favorable claim development of $73 million on the 2017 natural catastrophes. The higher than expected non-catastrophe homeowners losses were primarily severity driven and included water-related claims, large fire losses, and non-catastrophe weather claims; and
- Net favorable development of $24 million in our personal excess lines primarily impacting the 2015 accident year, due to lower than expected loss emergence and an increase in weighting towards experience-based methods.

2017
North America Personal P&C Insurance incurred net adverse PPD of $69 million, representing 0.1 percent of the beginning consolidated net unpaid losses and loss expense reserves.

North America Agricultural Insurance
North America Agricultural Insurance experienced net favorable PPD of $80 million, $110 million, and $119 million in 2019, 2018, and 2017, respectively. Actual claim development mainly relates to our Multiple Peril Crop Insurance business and was favorable due to better than expected crop yield results in certain states at the prior year-end period (i.e., 2019 results based on crop yield results at year-end 2018).

Overseas General Insurance
2019
Overseas General Insurance experienced net favorable PPD of $92 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable development of $68 million in long-tail business, primarily from:
    - Net favorable development of $101 million in casualty lines, including favorable development of $123 million in accident years 2015 and prior, due to lower than expected loss emergence mainly across primary lines in Continental Europe, U.K., and Asia Pacific, partially offset by adverse development of $22 million in accident years 2016 through 2018, primarily due to adverse attritional and large loss experience in Continental Europe; and
    - Net adverse development of $52 million in financial lines, including adverse development of $127 million in accident years 2016 through 2018, primarily due to adverse large loss experience in D&O in the U.K. and Asia Pacific, offset by favorable development of $75 million in accident years 2015 and prior, due to lower than expected loss emergence across most regions in D&O and Professional Indemnity.

- Net favorable of $24 million in short-tail business, primarily from:
  - Net favorable development of $45 million in A&H, driven by favorable development across Continental Europe, Latin America and Asia Pacific primarily in accident years 2017 and 2018;
  - Net favorable development of $36 million in marine, driven by favorable loss emergence and claim-specific loss settlements across most regions and several accident years, including favorable liability emergence and litigation settlements in accident years 2016 and prior;
  - Net adverse development of $23 million in construction, driven by adverse large loss experience in accident year 2018 for U.K. and Asia Pacific; and
  - Net adverse development of $27 million in Surety, driven by adverse large loss experience across Continental Europe and Latin America in accident years 2017 and 2018.

2018
Overseas General Insurance experienced net favorable PPD of $212 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable development of $67 million in long-tail business, primarily from:
  - Net favorable development of $70 million in casualty lines, with net favorable development of $107 million in accident years 2014 and prior, resulting from lower than expected loss emergence across primary and excess lines, partially offset by adverse development of $38 million in accident years 2015 through 2017, primarily due to large loss experience in U.K. excess lines and wholesale business;
  - Favorable development of $32 million, primarily including $12 million in political risks, $10 million in aviation and $10 million in environmental; and
  - Net adverse development of $38 million in financial lines, with net favorable development of $93 million in accident years 2014 and prior, resulting from lower than expected loss emergence including favorable development due to specific large claim reductions in Asia financial institutions including wholesale bankers D&O and bankers professional indemnity, and adverse development of $131 million in accident years 2015 through 2017, primarily due to adverse large loss experience in specific D&O and financial institutions portfolios in Australia, Continental Europe and the U.K.
- Net favorable development of $145 million in short-tail business, primarily from:
  - Net favorable development of $99 million in property and marine (excluding technical lines), primarily in accident years 2013 through 2016, driven mainly by favorable loss emergence across all regions, including favorable claim-specific loss settlements and salvage/subrogation recoveries;
  - Net favorable development of $33 million in A&H, primarily in accident years 2015 through 2017, driven by favorable development across Asia Pacific direct marketing and Continental Europe corporate lines.

2017
Overseas General Insurance experienced net favorable PPD of $252 million, representing 0.5 percent of the beginning consolidated net unpaid losses and loss expense reserves.

Global Reinsurance
2019
Global Reinsurance experienced net favorable PPD of $29 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable development of $59 million in long-tail business, primarily in our auto, casualty, professional liability, medical malpractice, and workers' compensation lines primarily from treaty years 2013 and prior principally due to lower than expected loss emergence; and
- Net adverse development of $30 million in short-tail business, which included $44 million of adverse development on 2017 and 2018 natural catastrophe events.

2018
Global Reinsurance experienced net favorable PPD of $50 million, which was the net result of several underlying favorable and adverse movements, and was driven by the following principal changes:

- Net favorable development of $69 million in long-tail business, primarily in our casualty, professional liability, medical malpractice, and workers' compensation lines primarily from treaty years 2013 and prior principally resulting from lower than expected loss emergence; and
- Net adverse development of $19 million in short-tail business, which included $18 million of net adverse claim development on the 2017 natural catastrophes.

2017
Global Reinsurance experienced net favorable PPD of $59 million, representing 0.1 percent of the beginning consolidated net unpaid losses and loss expense reserves.

Corporate
2019
Corporate incurred adverse development of $153 million in long-tail lines, driven by the following principal changes:

- Adverse development of $116 million driven principally by adverse development in asbestos and environmental liabilities due to the emergence of a limited number of excess accounts and somewhat greater than expected defense and indemnity costs (generally impacting larger modeled accounts); and
- Adverse development of $37 million on unallocated loss adjustment expenses due to run-off operating expenses paid and incurred in 2019.

2018
Corporate incurred adverse development of $45 million in long-tail lines, driven by the following principal changes:

- Adverse development of $216 million in run-off liabilities, driven primarily by increased exposure on a limited number of direct asbestos claims and environmental sites, somewhat greater than expected defense cost spending and increases in reported claims and settlements with respect to molestation exposures;
- Adverse development of $35 million on unallocated loss adjustment expenses due to run-off operating expenses paid and incurred in 2018; and
- Favorable development of $205 million as a result of the settlements of certain previously disputed reinsurance balances.

2017
Corporate incurred adverse PPD of $278 million, representing 0.6 percent of the beginning consolidated net unpaid losses and loss expense reserves.

Asbestos and environmental (A&E)
Chubb's exposure to A&E claims principally arises out of liabilities acquired when it purchased Westchester Specialty in 1998, CIGNA's P&C business in 1999, and Chubb Corp in 2016. The following table presents a roll-forward of consolidated A&E loss reserves including allocated loss expense reserves for A&E exposures, and the provision for uncollectible paid and unpaid reinsurance recoverables:

	Asbestos		Environmental		Total		
(in millions of U.S. dollars)	Gross	Net	Gross	Net	Gross	Net	
Balance at December 31, 2016	$ 1,726	$ 1,119	$ 577	$ 490	$ 2,303	$ 1,609	
Incurred activity	228	104	199	113	427	217	(1)
Paid activity	(333)	(172)	(169)	(127)	(502)	(299)	
Balance at December 31, 2017	1,621	1,051	607	476	2,228	1,527	
Incurred activity	136	75	101	(97)	237	(22)	(1)
Paid activity	(265)	(162)	(83)	104	(348)	(58)	
Balance at December 31, 2018	1,492	964	625	483	2,117	1,447	
Incurred activity	**129**	**70**	**46**	**28**	**175**	**98**	(1)
Paid activity	**(162)**	**(118)**	**(142)**	**(101)**	**(304)**	**(219)**	
Balance at December 31, 2019	**$ 1,459**	**$ 916**	**$ 529**	**$ 410**	**$ 1,988**	**$ 1,326**	

(1) Excludes unallocated loss expenses and the net activity reflects third-party reinsurance other than the aggregate excess of loss reinsurance provided by National Indemnity Company (NICO) to Westchester Specialty (see Westchester Specialty section below).

The A&E net loss reserves including allocated loss expense reserves and provision for uncollectible reinsurance at December 31, 2019 and 2018 shown in the table above is comprised of:

	December 31	
(in millions of U.S. dollars)	**2019**	2018
Brandywine operations	**$ 754**	$ 807
Westchester Specialty	**117**	120
Chubb Corp	**381**	442
Other, mainly Overseas General Insurance	**74**	78
Total	**$ 1,326**	$ 1,447

Brandywine Run-off entities – The Restructuring Plan and uncertainties relating to Chubb's ultimate Brandywine exposure

In 1996, the Pennsylvania Insurance Commissioner approved a plan to restructure INA Financial Corporation and its subsidiaries (the Restructuring) which included the division of Insurance Company of North America (INA) into two separate corporations:

(1) An active insurance company that retained the INA name and continued to write P&C business; and
(2) An inactive run-off company, now called Century Indemnity Company (Century).

As a result of the division, predominantly all A&E and certain other liabilities of INA were ascribed to Century and extinguished, as a matter of Pennsylvania law, as liabilities of INA.

As part of the Restructuring, most A&E liabilities of various U.S. affiliates of INA were reinsured to Century. Century and certain other run-off companies having A&E and other liabilities were contributed to Brandywine Holdings.

The U.S.-based Chubb INA companies assumed two contractual obligations in respect of the Brandywine operations in connection with the Restructuring: a surplus maintenance obligation in the form of the excess of loss (XOL) agreement and a dividend retention fund obligation.

XOL Agreement
In 1996, in connection with the Restructuring, a Chubb INA insurance subsidiary provided reinsurance coverage to Century in the amount of $800 million under an Aggregate Excess of Loss Reinsurance Agreement (XOL Agreement), triggerable if the statutory capital and surplus of Century falls below $25 million or if Century lacks liquid assets with which to pay claims as they become due.

Dividend Retention Fund
INA Financial Corporation established and funded a dividend retention fund (the Dividend Retention Fund) consisting of $50 million plus investment earnings. The full balance of the Dividend Retention Fund was contributed to Century as of December 31, 2002. Under the Restructuring Order, while any obligation to maintain the Dividend Retention Fund is in effect, to the extent dividends are paid by INA Holdings Corporation to its parent, INA Financial Corporation, and to the extent INA Financial Corporation then pays such dividends to INA Corporation, a portion of those dividends must be withheld to replenish the principal of the Dividend Retention Fund to $50 million. During 2019, 2018, 2011 and 2010, $90 million, $50 million, $35 million and $15 million, respectively, were withheld from such dividends and deposited into the Dividend Retention Fund as a result of dividends paid up to the INA Corporation. Pursuant to a 2011 amendment to the Restructuring Order, capital contributions from the Dividend Retention Fund to Century are not required until the XOL Agreement has less than $200 million of capacity remaining on an incurred basis for statutory reporting purposes. The amount of the capital contribution shall be the lesser of the amount necessary to restore the XOL Agreement remaining capacity to $200 million or the Dividend Retention Fund balance. In 2019 and 2018, the Pennsylvania Department of Insurance approved a capital contribution of $64 million and $39 million, respectively, from the Dividend Retention Fund to Century in order to restore the XOL capacity to $200 million. The Dividend Retention Fund may not be terminated without prior written approval from the Pennsylvania Insurance Commissioner.

Effective December 31, 2004, Chubb INA contributed $100 million to Century in exchange for a surplus note. After giving effect to the contribution and issuance of the surplus note, the statutory surplus of Century at December 31, 2019 was $25 million and $622 million in statutory-basis losses have been ceded to the XOL Agreement on an inception-to-date basis. Century reports the amount ceded under the XOL Agreement in accordance with statutory accounting principles, which differ from GAAP by, among other things, allowing Century to discount its liabilities, including certain asbestos related and environmental pollution liabilities and Century's reinsurance payable to active companies. For GAAP reporting purposes, intercompany reinsurance recoverables related to the XOL are eliminated upon consolidation.

While Chubb believes it has no legal obligation to fund Century losses above the XOL limit of coverage, Chubb's consolidated results would nevertheless continue to include any losses above the limit of coverage for so long as the Brandywine companies remain consolidated subsidiaries of Chubb.

Certain active Chubb companies are primarily liable for asbestos, environmental, and other exposures that they have reinsured to Century. Accordingly, if Century were to become insolvent and placed into rehabilitation or liquidation, some or all of the recoverables due to these active Chubb companies from Century could become uncollectible. At both December 31, 2019 and 2018, the aggregate reinsurance recoverables owed by Century to certain active Chubb companies were approximately $1.5 billion, on an undiscounted basis. Chubb believes the active company intercompany reinsurance recoverables, which relate to direct liabilities payable over many years, are not impaired. At December 31, 2019 and 2018, Century's carried gross reserves (including reserves assumed from the active Chubb companies) were $1.8 billion and $2.0 billion, respectively. Should Century's loss reserves experience adverse development in the future and should Century be placed into rehabilitation or liquidation, the reinsurance recoverables due from Century to certain active Chubb companies would be payable only after the payment in full of certain expenses and liabilities, including administrative expenses and direct policy liabilities. Thus, the intercompany reinsurance recoverables would be at risk to the extent of the shortage of assets remaining to pay these recoverables.

Westchester Specialty – impact of NICO contracts on Chubb's run-off entities

As part of the Westchester Specialty acquisition in 1998, NICO provided a 75 percent pro-rata share of $1.0 billion of reinsurance protection on losses and loss adjustment expenses incurred on or before December 31, 1996, in excess of a retention of $721 million. At December 31, 2019, the remaining unused incurred limit under the Westchester NICO agreement was $384 million.

8. Taxation

Under Swiss law through December 31, 2019, a resident company is subject to income tax at the federal, cantonal, and communal levels that is levied on net worldwide income. Income attributable to permanent establishments or real estate located abroad is excluded from the Swiss tax base. Chubb Limited is a holding company and, therefore, is exempt from cantonal and communal income tax. As a result, Chubb Limited is subject to Swiss income tax only at the federal level. Furthermore, participation relief (i.e., tax relief) is granted to Chubb Limited at the federal level for qualifying dividend income and capital gains related to the sale of qualifying participations (i.e., subsidiaries). It is expected that the participation relief will result in a full exemption of participation income from federal income tax. Chubb Limited is subject to an annual cantonal and communal capital tax on the taxable equity of Chubb Limited in Switzerland.

Chubb has two Swiss operating subsidiaries, an insurance company, Chubb Insurance (Switzerland) Limited and a reinsurance company, Chubb Reinsurance (Switzerland) Limited. Both are subject to federal, cantonal, and communal income tax and to annual cantonal and communal capital tax.

Under current Bermuda law, Chubb Limited and its Bermuda subsidiaries are not required to pay any taxes on income or capital gains. If a Bermuda law were enacted that would impose taxes on income or capital gains, Chubb Limited and the Bermuda subsidiaries have received an undertaking from the Minister of Finance in Bermuda that would exempt such companies from Bermudian taxation until March 2035.

Income from Chubb's operations at Lloyd's is subject to United Kingdom (U.K.) corporation taxes. Lloyd's is required to pay U.S. income tax on U.S. connected income (U.S. income) written by Lloyd's syndicates. Lloyd's has a closing agreement with the Internal Revenue Service (IRS) whereby the amount of tax due on this business is calculated by Lloyd's and remitted directly to the IRS. These amounts are then charged to the accounts of Chubb's Corporate Members in proportion to their participation in the relevant syndicates. Chubb's Corporate Members are subject to this arrangement but, as U.K. domiciled companies, will receive U.K. corporation tax credits for any U.S. income tax incurred up to the value of the equivalent U.K. corporation income tax charge on the U.S. income.

Chubb Group Holdings and its respective subsidiaries are subject to income taxes imposed by U.S. authorities and file a consolidated U.S. Federal income tax return. Should Chubb Group Holdings pay a dividend to Chubb Limited, withholding taxes would apply. Currently, however, no withholding taxes are accrued with respect to such un-remitted earnings as management has no intention of remitting these earnings. Similarly, no taxes have been provided on the un-remitted earnings of certain foreign subsidiaries (Hong Kong and Korea life companies) as management has no intention of remitting these earnings. The cumulative amount that would be subject to withholding tax, if distributed, as well as the determination of the associated tax liability are not practicable to compute; however, such amount would be material.

Certain international operations of Chubb are also subject to income taxes imposed by the jurisdictions in which they operate.

Chubb's domestic operations are in Switzerland, the jurisdiction where we are legally organized, incorporated, and registered.

The following table presents pre-tax income and the related provision for income taxes:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Pre-tax income:			
Switzerland	**$ 440**	$ 950	$ 527
Outside Switzerland	**4,809**	3,707	3,195
Total pre-tax income	**$ 5,249**	$ 4,657	$ 3,722
Provision for income taxes			
Current tax expense:			
Switzerland	**$ 29**	$ 89	$ 46
Outside Switzerland	**879**	563	313
Total current tax expense	**908**	652	359
Deferred tax expense (benefit):			
Switzerland	**11**	3	2
Outside Switzerland	**(124)**	40	(500)
Total deferred tax expense (benefit)	**(113)**	43	(498)
Provision for income taxes	**$ 795**	$ 695	$ (139)

The most significant jurisdictions contributing to the overall taxation of Chubb are calculated using the following rates in 2019: Switzerland 7.83 percent, Bermuda 0.0 percent, U.S. 21.0 percent, and U.K. 19.0 percent.

The following table presents a reconciliation of the difference between the provision for income taxes and the expected tax provision at the Swiss statutory income tax rate:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Expected tax provision at Swiss statutory tax rate	**$ 411**	$ 365	$ 291
Permanent differences:			
Taxes on earnings subject to rate other than Swiss statutory rate	**376**	372	263
Tax-exempt interest and dividends received deduction, net of proration	**(49)**	(75)	(199)
Net withholding taxes	**40**	33	30
Excess tax benefit on share-based compensation	**(12)**	(19)	(48)
Impact of 2017 Tax Act	**—**	(25)	(450)
Corporate owned life insurance	**(13)**	2	(37)
Other	**42**	42	11
Provision for income taxes	**$ 795**	$ 695	$ (139)

The 2017 Tax Act, enacted in December 2017, among other things, reduced the U.S. Federal income tax rate from 35 percent to 21 percent effective in 2018. In the fourth quarter of 2017, we recorded a $450 million income tax benefit on a provisional basis, and an additional $25 million in 2018, principally reflecting this reduction in the U.S. corporate tax rate from 35 percent to 21 percent. Our final $475 million income tax benefit was comprised of a $743 million reduction in the deferred tax liabilities principally related to certain intangible assets, a $250 million reduction in net deferred tax assets related to other net assets, a net charge of $18 million related to the impact of excess foreign tax credits, withholding taxes associated with unremitted earnings and the impact of the reduced rate on our foreign branches. The 2018 change reflected the favorable impact of changes to certain tax only accounting methods offset by updates to provisional amounts recorded related to foreign tax credits and withholding taxes as a result of additional guidance issued during 2018.

The following table presents the components of net deferred tax assets and liabilities:

(in millions of U.S. dollars)	December 31 2019	December 31 2018
Deferred tax assets:		
Loss reserve discount	$ 826	$ 584
Unearned premiums reserve	519	471
Foreign tax credits	247	262
Provision for uncollectible balances	37	37
Loss carry-forwards	143	137
Debt related amounts	74	71
Compensation related amounts	261	263
Cumulative translation adjustments	33	43
Unrealized depreciation on investments	—	102
Lease liability	140	—
Other, net	—	95
Total deferred tax assets	2,280	2,065
Deferred tax liabilities:		
Deferred policy acquisition costs	588	621
Other intangible assets, including VOBA	1,468	1,440
Un-remitted foreign earnings	73	47
Investments	40	59
Unrealized appreciation on investments	470	—
Depreciation	157	123
Lease right-of-use asset	129	—
Other, net	45	—
Total deferred tax liabilities	2,970	2,290
Valuation allowance	114	79
Net deferred tax liabilities	$ (804)	$ (304)

The 2017 Tax Act also included provisions for Global Intangible Low-Taxed Income (GILTI) under which taxes may be imposed on income of foreign subsidiaries and for a Base Erosion and Anti-Abuse Tax (BEAT) under which taxes may be imposed on certain payments to affiliated foreign companies. We have evaluated the accounting policy election required with regard to the GILTI and BEAT provisions, and have concluded we will treat both as a period cost. As a result, we have recorded no related deferred taxes.

The valuation allowance of $114 million at December 31, 2019, and $79 million at December 31, 2018, reflects management's assessment, based on available information, that it is more likely than not that a portion of the deferred tax assets will not be realized due to the inability of certain foreign subsidiaries to generate sufficient taxable income. Adjustments to the valuation allowance are made when there is a change in management's assessment of the amount of deferred tax assets that are realizable.

At December 31, 2019, Chubb has net operating loss carry-forwards of $496 million which, if unused, will expire starting in 2020, and a foreign tax credit carry-forward in the amount of $247 million which, if unused, will expire starting in 2026.

The following table presents a reconciliation of the beginning and ending amount of gross unrecognized tax benefits:

(in millions of U.S. dollars)	December 31 2019	December 31 2018
Balance, beginning of year	$ 14	$ 13
Additions based on tax positions related to the current year	12	1
Additions based on tax positions related to prior years	23	—
Reductions for tax positions of prior years	—	—
Reductions for the lapse of the applicable statutes of limitations	(2)	—
Balance, end of year	$ 47	$ 14

At December 31, 2019 and 2018, the gross unrecognized tax benefits of $47 million and $14 million, respectively, can be reduced by $19 million and nil, respectively, associated with foreign tax credits. The net amounts of $28 million and $14 million at December 31, 2019 and 2018, respectively, if recognized, would favorably affect the effective tax rate. It is reasonably possible that over the next twelve months, that the amount of unrecognized tax benefits may change resulting from the re-evaluation of unrecognized tax benefits arising from examinations by taxing authorities and the lapses of statutes of limitations.

Chubb recognizes accruals for interest and penalties, if any, related to unrecognized tax benefits in income tax expense in the Consolidated statements of operations. Tax-related interest expense (income) and penalties reported in the Consolidated statements of operations were $5 million at December 31, 2019, and were immaterial for 2018, and 2017. Liabilities for tax-related interest and penalties in our Consolidated balance sheets were $8 million and $3 million at December 31, 2019 and 2018, respectively.

In March 2017, the IRS commenced its field examination of Chubb Group Holdings' U.S. Federal income tax returns for 2014 and 2015 and Chubb Corp's U.S. Federal income tax return for 2014. The Chubb Group Holdings examination for 2014 and 2015 tax years is still ongoing with no material adjustments proposed to date. In February 2019, the IRS completed its examinations of Chubb Corp's 2014 return with no material adjustments. Chubb Corp's U.S. Federal income tax returns for 2015 and the short period return for 2016 were not examined by the IRS and the statute of limitations for those years closed during 2019. In September 2019, we were notified by the IRS of its intention to examine the 2016 and 2017 tax returns of Chubb Group Holdings. That examination is yet to begin. As a multinational company, we also have examinations under way in several foreign jurisdictions. With few exceptions, Chubb is no longer subject to income tax examinations for years prior to 2010.

The following table summarizes tax years open for examination by major income tax jurisdiction:

At December 31, 2019	
Australia	2014 - 2019
Canada	2012 - 2019
France	2017 - 2019
Germany	2015 - 2019
Italy	2010 - 2019
Mexico	2014 - 2019
Spain	2012 - 2019
Switzerland	2015 - 2019
United Kingdom	2015 - 2019
United States	2014 - 2019

9. Debt

(in millions of U.S. dollars)		December 31 2019		December 31 2018	Early Redemption Option
Repurchase agreements (weighted average interest rate of 2.2% in 2019 and 2.5% in 2018)	**$**	**1,416**	$	1,418	None
Short-term debt					
Chubb INA senior notes:					
$500 million 5.9% due June 2019	**$**	**—**	$	500	Make-whole premium plus 0.40%
$1,300 million 2.3% due November 2020		**1,298**		—	Make-whole premium plus 0.15%
Other short-term debt (2.75% to 7.1% due December 2019 to September 2020)		**1**		9	None
Total short-term debt	**$**	**1,299**	$	509	
Long-term debt					
Chubb INA senior notes:					
$1,300 million 2.3% due November 2020	**$**	**—**	$	1,297	Make-whole premium plus 0.15%
$1,000 million 2.875% due November 2022		**997**		996	Make-whole premium plus 0.20%
$475 million 2.7% due March 2023		**473**		473	Make-whole premium plus 0.10%
$700 million 3.35% due May 2024		**697**		696	Make-whole premium plus 0.15%
€700 million 0.3% due December 2024		**776**		—	Make-whole premium plus 0.15%
$800 million 3.15% due March 2025		**796**		796	Make-whole premium plus 0.15%
$1,500 million 3.35% due May 2026		**1,492**		1,491	Make-whole premium plus 0.20%
€575 million 0.875% due June 2027		**635**		—	Make-whole premium plus 0.20%
€900 million 1.55% due March 2028		**993**		1,008	Make-whole premium plus 0.15%
$100 million 8.875% due August 2029		**100**		100	None
€700 million 0.875% due December 2029		**775**		—	Make-whole premium plus 0.20%
€575 million 1.4% due June 2031		**633**		—	Make-whole premium plus 0.25%
$200 million 6.8% due November 2031		**246**		250	Make-whole premium plus 0.25%
$300 million 6.7% due May 2036		**297**		297	Make-whole premium plus 0.20%
$800 million 6.0% due May 2037		**953**		962	Make-whole premium plus 0.20%
€900 million 2.5% due March 2038		**992**		1,008	Make-whole premium plus 0.25%
$600 million 6.5% due May 2038		**751**		759	Make-whole premium plus 0.30%
$475 million 4.15% due March 2043		**470**		470	Make-whole premium plus 0.15%
$1,500 million 4.35% due November 2045		**1,483**		1,483	Make-whole premium plus 0.25%
Other long-term debt (2.75% due September 2020)		**—**		1	None
Total long-term debt	**$**	**13,559**	$	12,087	
Trust preferred securities					
Chubb INA capital securities due April 2030	**$**	**308**	$	308	Redemption prices[(1)]

(1) Redemption prices are equal to accrued and unpaid interest to the redemption date plus the greater of (i) 100 percent of the principal amount thereof, or (ii) sum of present value of scheduled payments of principal and interest on the capital securities from the redemption date to April 1, 2030.

a) Repurchase agreements
Chubb has executed repurchase agreements with certain counterparties under which Chubb agreed to sell securities and repurchase them at a future date for a predetermined price.

b) Short-term debt
Short-term debt comprises the current maturities of our long-term debt instruments described below. These short-term debt instruments were reclassified from long-term debt during 2019 and are reflected in the table above. Chubb INA Holdings Inc.'s (Chubb INA) $500 million of 5.9 percent senior notes due June 2019 was paid upon maturity.

c) Long-term debt
Certain of Chubb INA's senior notes and capital securities are redeemable at any time at Chubb INA's option subject to the provisions described in the table above. A "make-whole" premium is the present value of the remaining principal and interest discounted at the applicable U.S. Treasury rate. The senior notes and capital securities are also redeemable at par plus accrued and unpaid interest in the event of certain changes in tax law.

The senior notes do not have the benefit of any sinking fund. These senior unsecured notes are guaranteed on a senior basis by Chubb Limited and they rank equally with all of Chubb's other senior obligations. They also contain customary limitations on lien provisions as well as customary events of default provisions which, if breached, could result in the accelerated maturity of such senior debt.

In June 2019, Chubb INA issued €575 million ($650 million based on the foreign exchange rate at the date of issuance) of 0.875 percent Euro denominated senior notes due June 2027 and €575 million ($650 million based on the foreign exchange rate at the date of issuance) of 1.4 percent Euro denominated senior notes due June 2031.

In December 2019, Chubb INA issued €700 million ($779 million based on the foreign exchange rate at the date of issuance) of 0.30 percent Euro denominated senior notes due December 2024 and €700 million ($779 million based on the foreign exchange rate at the date of issuance) of 0.875 percent Euro denominated senior notes due December 2029.

These senior notes are redeemable at any time at Chubb INA's option subject to a “make-whole” premium (the present value of the remaining principal and interest discounted at the applicable comparable government bond rate plus 15 basis points for the senior notes due 2024, 20 basis points for the senior notes due 2027 and 2029 and 25 basis points for the senior notes due 2031). The notes are also redeemable at par plus accrued and unpaid interest in the event of certain changes in tax law. These notes do not have the benefit of any sinking fund. These senior unsecured notes are guaranteed on a senior basis by Chubb and they rank equally with all of Chubb's other senior obligations. They also contain customary limitations on lien provisions as well as customary events of default provisions which, if breached, could result in the accelerated maturity of such senior debt.

d) Trust preferred securities
In March 2000, ACE Capital Trust II, a Delaware statutory business trust, publicly issued $300 million of 9.7 percent Capital Securities (the Capital Securities) due to mature in April 2030. At the same time, Chubb INA purchased $9.2 million of common securities of ACE Capital Trust II. The sole assets of ACE Capital Trust II consist of $309 million principal amount of 9.7 percent Junior Subordinated Deferrable Interest Debentures (the Subordinated Debentures) issued by Chubb INA due to mature in April 2030.

Distributions on the Capital Securities are payable semi-annually and may be deferred for up to ten consecutive semi-annual periods (but no later than April 1, 2030). Any deferred payments would accrue interest compounded semi-annually if Chubb INA defers interest on the Subordinated Debentures. Interest on the Subordinated Debentures is payable semi-annually. Chubb INA may defer such interest payments (but no later than April 1, 2030), with such deferred payments accruing interest compounded semi-annually. The Capital Securities and the ACE Capital Trust II Common Securities will be redeemed upon repayment of the Subordinated Debentures.

Chubb Limited has guaranteed, on a subordinated basis, Chubb INA's obligations under the Subordinated Debentures, and distributions and other payments due on the Capital Securities. These guarantees, when taken together with Chubb's obligations under expense agreements entered into with ACE Capital Trust II, provide a full and unconditional guarantee of amounts due on the Capital Securities.

10. Commitments, contingencies, and guarantees

a) Derivative instruments

Foreign currency management

As a global company, Chubb entities transact business in multiple currencies. Our policy is to generally match assets, liabilities, and required capital for each individual jurisdiction in local currency, which would include the use of derivatives discussed below. We do not hedge our net asset non-U.S. dollar capital positions; however, we do consider economic hedging for planned cross border transactions.

Derivative instruments employed

Chubb maintains positions in derivative instruments such as futures, options, swaps, and foreign currency forward contracts for which the primary purposes are to manage duration and foreign currency exposure, yield enhancement, or to obtain an exposure to a particular financial market. Chubb also maintains positions in convertible securities that contain embedded derivatives. Investment derivative instruments are recorded in either Other assets (OA) or Accounts payable, accrued expenses, and other liabilities (AP), convertible bonds are recorded in Fixed maturities available for sale (FM AFS), and convertible equity securities are recorded in Equity securities (ES) in the Consolidated balance sheets. These are the most numerous and frequent derivative transactions. In addition, Chubb purchases to be announced mortgage-backed securities (TBAs) as part of its investing activities.

Under reinsurance programs covering GLBs, Chubb assumes the risk of GLBs, (principally GMIB) associated with variable annuity contracts. The GMIB risk is triggered if, at the time the contract holder elects to convert the accumulated account value to a periodic payment stream (annuitize), the accumulated account value is not sufficient to provide a guaranteed minimum level of monthly income. The GLB reinsurance product meets the definition of a derivative instrument. Benefit reserves in respect of GLBs are classified as Future policy benefits (FPB) while the fair value derivative adjustment is classified within AP. Chubb also generally maintains positions in exchange-traded equity futures contracts on equity market indices to limit equity exposure in the GMDB and GLB book of business. All derivative instruments are carried at fair value with changes in fair value recorded in Net realized gains (losses) in the Consolidated statements of operations. None of the derivative instruments are designated as hedges for accounting purposes. The following table presents the balance sheet locations, fair values of derivative instruments in an asset or (liability) position, and notional values/payment provisions of our derivative instruments:

		December 31, 2019			December 31, 2018		
		Fair Value		Notional Value/ Payment Provision	Fair Value		Notional Value/ Payment Provision
(in millions of U.S. dollars)	Consolidated Balance Sheet Location	Derivative Asset	Derivative (Liability)		Derivative Asset	Derivative (Liability)	
Investment and embedded derivative instruments:							
Foreign currency forward contracts	OA / (AP)	$ 11	$ (78)	$ 2,579	$ 15	$ (19)	$ 2,185
Cross-currency swaps	OA / (AP)	—	—	—	—	—	45
Interest rate swaps	OA / (AP)	—	—	—	—	(115)	5,250
Options/Futures contracts on notes, bonds, and equities	OA / (AP)	13	(15)	1,615	13	(19)	1,046
Convertible securities (1)	FM AFS / ES	4	—	5	9	—	11
TBAs	FM AFS	—	—	—	6	—	6
		$ 28	$ (93)	$ 4,199	$ 43	$ (153)	$ 8,543
Other derivative instruments:							
Futures contracts on equities (2)	OA / (AP)	$ —	$ (13)	$ 613	$ 23	$ —	$ 507
Other	OA / (AP)	2	—	63	2	—	74
		$ 2	$ (13)	$ 676	$ 25	$ —	$ 581
GLB (3)	(AP) / (FPB)	$ —	$ (897)	$ 1,510	$ —	$ (861)	$ 1,750

(1) Includes fair value of embedded derivatives.
(2) Related to GMDB and GLB book of business.
(3) Includes both future policy benefits reserves of $441 million and $409 million and fair value derivative adjustment of $456 million and $452 million at December 31, 2019 and 2018, respectively. Refer to Note 5 c) for additional information. Note that the payment provision related to GLB is the net amount at risk. The concept of a notional value does not apply to the GLB reinsurance contracts.

At December 31, 2019 and 2018, derivative liabilities of $75 million and $95 million, respectively, included in the table above were subject to a master netting agreement. The remaining derivatives included in the table above were not subject to a master netting agreement.

b) Derivative instrument objectives
(i) Foreign currency exposure management
A foreign currency forward contract (forward) is an agreement between participants to exchange specific foreign currencies at a future date. Chubb uses forwards to minimize the effect of fluctuating foreign currencies as discussed above.

(ii) Duration management and market exposure
Futures
Futures contracts give the holder the right and obligation to participate in market movements, determined by the index or underlying security on which the futures contract is based. Settlement is made daily in cash by an amount equal to the change in value of the futures contract times a multiplier that scales the size of the contract. Exchange-traded futures contracts on money market instruments, notes and bonds are used in fixed maturity portfolios to more efficiently manage duration, as substitutes for ownership of the money market instruments, bonds and notes without significantly increasing the risk in the portfolio. Investments in futures contracts may be made only to the extent that there are assets under management not otherwise committed.

Exchange-traded equity futures contracts are used to limit exposure to a severe equity market decline, which would cause an increase in expected claims and therefore, an increase in reserves for GMDB and GLB reinsurance business.

Options
An option contract conveys to the holder the right, but not the obligation, to purchase or sell a specified amount or value of an underlying security at a fixed price. Option contracts are used in our investment portfolio as protection against unexpected shifts in interest rates, which would affect the duration of the fixed maturity portfolio. By using options in the portfolio, the overall interest rate sensitivity of the portfolio can be reduced. Option contracts may also be used as an alternative to futures contracts in the synthetic strategy as described above.

The price of an option is influenced by the underlying security, expected volatility, time to expiration, and supply and demand.

The credit risk associated with the above derivative financial instruments relates to the potential for non-performance by counterparties. Although non-performance is not anticipated, in order to minimize the risk of loss, management monitors the creditworthiness of its counterparties and obtains collateral. The performance of exchange-traded instruments is guaranteed by the exchange on which they trade. For non-exchange-traded instruments, the counterparties are principally banks which must meet certain criteria according to our investment guidelines.

Interest rate swaps
An interest rate swap is a contract between two counterparties in which interest payments are made based on a notional principal amount, which itself is never paid or received. Under the terms of an interest rate swap, one counterparty makes interest payments based on a fixed interest rate and the other counterparty's payments are based on a floating rate. Interest rate swap contracts are used occasionally in our investment portfolio as protection against unexpected shifts in interest rates, which would affect the fair value of the fixed maturity portfolio. By using interest rate swaps in the portfolio, the overall duration or interest rate sensitivity of the portfolio can be impacted.

Cross-currency swaps
Cross-currency swaps are agreements under which two counterparties exchange interest payments and principal denominated in different currencies at a future date. We use cross-currency swaps to reduce the foreign currency and interest rate risk by converting cash flows back into local currency. We invest in foreign currency denominated investments to improve credit diversification and also to obtain better duration matching to our liabilities that is limited in the local currency market.

Other
Included within Other are derivatives intended to reduce potential losses which may arise from certain exposures in our insurance business. The economic benefit provided by these derivatives is similar to purchased reinsurance. For example, Chubb may enter into crop derivative contracts to protect underwriting results in the event of a significant decline in commodity prices.

(iii) Convertible security investments
A convertible security is a debt instrument or preferred stock that can be converted into a predetermined amount of the issuer's equity. The convertible option is an embedded derivative within the host instruments which are classified in the investment portfolio as either available for sale or as an equity security. Chubb purchases convertible securities for their total return and not specifically for the conversion feature.

(iv) TBA
By acquiring TBAs, we make a commitment to purchase a future issuance of mortgage-backed securities. For the period between purchase of the TBAs and issuance of the underlying security, we account for our position as a derivative in the consolidated financial statements. Chubb purchases TBAs both for their total return and for the flexibility they provide related to our mortgage-backed security strategy.

(v) GLB
Under the GLB program, as the assuming entity, Chubb is obligated to provide coverage until the expiration or maturity of the underlying deferred annuity contracts or the expiry of the reinsurance treaty. Premiums received under the reinsurance treaties are classified as premium. Expected losses allocated to premiums received are classified as Future policy benefits and valued similar to GMDB reinsurance. Other changes in fair value arise principally from changes in expected losses allocated to expected future premiums. Fair value represents management's estimate of an exit price and thus, includes a risk margin. We may recognize a realized loss for other changes in fair value due to adverse changes in the capital markets (e.g., declining interest rates and/or declining U.S. and/or international equity markets) and changes in actual or estimated future policyholder behavior (e.g., increased annuitization or decreased lapse rates) although we expect the business to be profitable.

To mitigate adverse changes in the capital markets, we maintain positions in exchange-traded equity futures contracts, as noted under section "(ii) Futures" above. These futures increase in fair value when the S&P 500 index decreases (and decrease in fair value when the S&P 500 index increases). The net impact of gains or losses related to changes in fair value of the GLB liability and the exchange-traded equity futures are included in Net realized gains (losses).

c) Securities lending and secured borrowings
Chubb participates in a securities lending program operated by a third-party banking institution whereby certain assets are loaned to qualified borrowers and from which we earn an incremental return. The securities lending collateral can only be drawn down by Chubb in the event that the institution borrowing the securities is in default under the lending agreement. An indemnification agreement with the lending agent protects us in the event a borrower becomes insolvent or fails to return any of the securities on loan. The collateral is recorded in Securities lending collateral and the liability is recorded in Securities lending payable in the Consolidated balance sheets. The following table presents the carrying value of collateral held under securities lending agreements by investment category and remaining contractual maturity of the underlying agreements:

	Remaining contractual maturity	
	December 31, 2019	December 31, 2018
(in millions of U.S. dollars)	Overnight and Continuous	
Collateral held under securities lending agreements:		
Cash	**$ 346**	$ 756
U.S. Treasury and agency	**6**	64
Foreign	**595**	795
Corporate securities	**5**	15
Mortgage-backed securities	**18**	45
Equity securities	**24**	251
	$ 994	$ 1,926
Gross amount of recognized liability for securities lending payable	**$ 994**	$ 1,926

At December 31, 2019 and 2018, our repurchase agreement obligations of $1,416 million and $1,418 million, respectively, were fully collateralized. In contrast to securities lending programs, the use of cash received is not restricted for the repurchase obligations. The fair value of the underlying securities sold remains in Fixed maturities available for sale, and the repurchase agreement obligation is recorded in Repurchase agreements in the Consolidated balance sheets.

The following table presents the carrying value of collateral pledged under repurchase agreements by investment category and remaining contractual maturity of the underlying agreements:

	Remaining contractual maturity						
	December 31, 2019				December 31, 2018		
(in millions of U.S. dollars)	**Up to 30 Days**	**30-90 Days**	**Greater than 90 Days**	**Total**	30-90 Days	Greater than 90 Days	Total
Collateral pledged under repurchase agreements:							
Cash	**$ 2**	**$ —**	**$ —**	**$ 2**	$ —	$ —	$ —
U.S. Treasury and agency	**107**	**—**	**—**	**107**	—	259	259
Mortgage-backed securities	**399**	**476**	**480**	**1,355**	496	713	1,209
	$ 508	**$ 476**	**$ 480**	**$ 1,464**	$ 496	$ 972	$ 1,468
Gross amount of recognized liabilities for repurchase agreements				**$ 1,416**			$ 1,418
Difference (1)				**$ 48**			$ 50

(1) Per the repurchase agreements, the amount of collateral posted is required to exceed the amount of gross liability.

Potential risks exist in our secured borrowing transactions due to market conditions and counterparty exposure. With collateral that we pledge, there is a risk that the collateral may not be returned at the expiration of the agreement. If the counterparty fails to return the collateral, Chubb will have free use of the borrowed funds until our collateral is returned. In addition, we may encounter the risk that Chubb may not be able to renew outstanding borrowings with a new term or with an existing counterparty due to market conditions including a decrease in demand as well as more restrictive terms from banks due to increased regulatory and capital constraints. Should this condition occur, Chubb may seek alternative borrowing sources or reduce borrowings. Additionally, increased margins and collateral requirements due to market conditions would increase our restricted assets as we are required to provide additional collateral to support the transaction.

The following table presents net realized gains (losses) related to derivative instrument activity in the Consolidated statements of operations:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Investment and embedded derivative instruments:			
Foreign currency forward contracts	**$ (79)**	$ 3	$ 9
Interest rate swaps	**(270)**	(115)	—
All other futures contracts, options, and equities	**(88)**	39	(21)
Convertible securities (1)	**2**	(2)	1
Total investment and embedded derivative instruments	**$ (435)**	$ (75)	$ (11)
GLB and other derivative instruments:			
GLB (2)	**$ (4)**	$ (248)	$ 364
Futures contracts on equities (3)	**(138)**	(4)	(261)
Other	**(8)**	(3)	(5)
Total GLB and other derivative instruments	**$ (150)**	$ (255)	$ 98
	$ (585)	$ (330)	$ 87

(1) Includes embedded derivatives.
(2) Excludes foreign exchange gains (losses) related to GLB.
(3) Related to GMDB and GLB book of business.

d) Concentrations of credit risk
Our investment portfolio is managed following prudent standards of diversification. Specific provisions limit the allowable holdings of a single issue and issuer. We believe that there are no significant concentrations of credit risk associated with our investments. Our three largest corporate exposures by issuer at December 31, 2019, were Wells Fargo & Co., Bank of America Corp, and JP Morgan Chase & Co. Our largest exposure by industry at December 31, 2019 was financial services.

We market our insurance and reinsurance worldwide primarily through insurance and reinsurance brokers. We assume a degree of credit risk associated with brokers with whom we transact business. For the years ended December 31, 2019 and 2018, approximately 12 percent and 10 percent, respectively, of our gross premiums written was generated from or placed by Marsh & McLennan Companies, Inc. This entity is a large, well-established company, and there are no indications that it is financially troubled at December 31, 2019. No broker or one insured accounted for more than 10 percent of our gross premiums written for the year ended December 31, 2017.

As discussed in Note 2, we committed to purchase an additional 22.4 percent interest in Huatai Group. In connection with these purchase agreements, in January 2020, we paid collateralized deposits totaling $1.550 billion to the selling shareholders, which are accounted for as loans. There is credit exposure with the current selling shareholders until the obligations under the purchase agreements are satisfied, which is expected by the end of 2021.

e) Fixed maturities
At December 31, 2019, we have commitments to purchase fixed income securities of $731 million over the next several years.

f) Other investments
At December 31, 2019, included in Other investments in the Consolidated balance sheet are investments in limited partnerships and partially-owned investment companies with a carrying value of $4.7 billion. In connection with these investments, we have commitments that may require funding of up to $3.3 billion over the next several years.

g) Letters of credit
On October 25, 2017, we entered into a credit facility that provides for up to $1.0 billion of availability, all of which may be used for the issuance of letters of credit and for revolving loans. We have the ability to increase the capacity under our existing credit facility to $2.0 billion under certain conditions, but any such increase would not raise the sub-limit for revolving loans above $1.0 billion. Our existing credit facility has a remaining term expiring in October 2022. At December 31, 2019, our LOC usage was $567 million.

h) Legal proceedings
Our insurance subsidiaries are subject to claims litigation involving disputed interpretations of policy coverages and, in some jurisdictions, direct actions by allegedly-injured persons seeking damages from policyholders. These lawsuits, involving claims on policies issued by our subsidiaries which are typical to the insurance industry in general and in the normal course of business, are considered in our loss and loss expense reserves. In addition to claims litigation, we are subject to lawsuits and regulatory actions in the normal course of business that do not arise from or directly relate to claims on insurance policies. This category of business litigation typically involves, among other things, allegations of underwriting errors or misconduct, employment claims, regulatory activity, or disputes arising from our business ventures. In the opinion of management, our ultimate liability for these matters could be, but we believe is not likely to be, material to our consolidated financial condition and results of operations.

i) Lease commitments
At December 31, 2019, the right-of-use asset was $551 million recorded within Other assets, and the lease liability was $603 million, which was recorded within Accounts payable, accrued expenses, and other liabilities on the Consolidated balance sheet. These leases consist principally of real estate operating leases that are amortized on a straight-line basis over the term of the lease, which expire at various dates. As of December 31, 2019, the weighted average remaining lease term and weighted average discount rate for the operating leases was 5.4 years and 2.7 percent, respectively. Rent expense was $171 million, $169 million, and $211 million for the years ended December 31, 2019, 2018, and 2017, respectively.

Future minimum lease payments under the operating leases are expected to be as follows:

For the years ending December 31 (in millions of U.S. dollars)		
Undiscounted cash flows:		
2020	$	158
2021		136
2022		107
2023		88
2024		66
Thereafter		105
Total undiscounted lease payments	$	660
Less: Present value adjustment		57
Net lease liabilities reported as of December 31, 2019	$	603

11. Shareholders' equity

a) Common Shares
All of Chubb's Common Shares are authorized under Swiss corporate law. Though the par value of Common Shares is stated in Swiss francs, Chubb continues to use U.S. dollars as its reporting currency for preparing the consolidated financial statements. Under Swiss corporate law, we are generally prohibited from issuing Common Shares below their par value. If there were a need to raise common equity at a time when the trading price of Chubb's Common Shares is below par value, we would need in advance to obtain shareholder approval to decrease the par value of the Common Shares.

Dividend approval
At our May 2018 and 2017 annual general meetings, our shareholders approved an annual dividend for the following year of up to $2.92 per share and $2.84 per share, respectively, which was paid in four quarterly installments of $0.73 per share and $0.71 per share, respectively, at dates determined by the Board of Directors (Board) after the annual general meeting by way of a distribution from capital contribution reserves, transferred to free reserves for payment.

At our May 2019 annual general meeting, our shareholders approved an annual dividend for the following year of up to $3.00 per share, expected to be paid in four quarterly installments of $0.75 per share after the annual general meeting by way of distribution from capital contribution reserves, transferred to free reserves for payment. The Board will determine the record and payment dates at which the annual dividend may be paid until the date of the 2020 annual general meeting, and is authorized to abstain from distributing a dividend at its discretion. The first three quarterly installments each of $0.75 per share, have been distributed by the Board as expected.

Dividend distributions
Under Swiss corporate law, dividends must be stated in Swiss francs though dividend payments are made by Chubb in U.S. dollars. We issue dividends without subjecting them to withholding tax by way of distributions from capital contribution reserves and payment out of free reserves.

The following table presents dividend distributions per Common Share in Swiss francs (CHF) and U.S. dollars (USD):

	Year Ended December 31					
	2019		2018		2017	
	CHF	**USD**	CHF	USD	CHF	USD
Total dividend distributions per common share	**2.94**	**$ 2.98**	2.84	$ 2.90	2.76	$ 2.82

b) Shares issued, outstanding, authorized, and conditional

	Year Ended December 31		
	2019	2018	2017
Shares issued, beginning and end of year	**479,783,864**	479,783,864	479,783,864
Common Shares in treasury, beginning of year (at cost)	**(20,580,486)**	(15,950,685)	(13,815,148)
Net shares issued under employee share-based compensation plans	**3,210,427**	3,089,234	3,731,075
Shares repurchased	**(10,442,238)**	(7,719,035)	(5,866,612)
Common Shares in treasury, end of year (at cost)	**(27,812,297)**	(20,580,486)	(15,950,685)
Shares issued and outstanding, end of year	**451,971,567**	459,203,378	463,833,179

Increases in Common Shares in treasury are due to open market repurchases of Common Shares and the surrender of Common Shares to satisfy tax withholding obligations in connection with the vesting of restricted stock and the forfeiture of unvested restricted stock. Decreases in Common Shares in treasury are principally due to grants of restricted stock, exercises of stock options, and purchases under the Employee Stock Purchase Plan (ESPP).

Authorized share capital for general purposes
The Board has shareholder-approved authority as set forth in the Articles of Association to increase for general purposes Chubb's share capital from time to time until May 17, 2020, by the issuance of up to 200,000,000 fully paid up Common Shares, with a par value equal to the par value of Chubb's Common Shares as set forth in the Articles of Association at the time of any such issuance.

Conditional share capital for bonds and similar debt instruments
Chubb's share capital may be increased through the issuance of a maximum of 33,000,000 fully paid up Common Shares (with a par value of CHF 24.15 as of December 31, 2019) through the exercise of conversion and/or option or warrant rights granted in connection with bonds, notes, or similar instruments, issued or to be issued by Chubb, including convertible debt instruments.

Conditional share capital for employee benefit plans
Chubb's share capital may be increased through the issuance of a maximum of 25,410,929 fully paid up Common Shares (with a par value of CHF 24.15 as of December 31, 2019) in connection with the exercise of option rights granted to any employee of Chubb, director or other person providing services to Chubb.

c) Chubb Limited securities repurchases
From time to time, we repurchase shares as part of our capital management program and to partially offset potential dilution from the exercise of stock options and the granting of restricted stock under share-based compensation plans. The Board of Directors has authorized share repurchase programs as follows:

- $1.0 billion of Chubb Common Shares from November 17, 2016 through December 31, 2017
- $1.0 billion of Chubb Common Shares from January 1, 2018 through December 31, 2018
- $1.5 billion of Chubb Common Shares from December 1, 2018 through December 31, 2019
- $1.5 billion of Chubb Common Shares from November 21, 2019 through December 31, 2020

Share repurchases may be in the open market, in privately negotiated transactions, block trades, accelerated repurchases and/or through option or other forward transactions.

The following table presents repurchases of Chubb's Common Shares conducted in a series of open market transactions under the Board authorizations:

	Year Ended December 31			January 1, 2020 through
(in millions of U.S. dollars, except share data)	**2019**	2018	2017	February 26, 2020
Number of shares repurchased	**10,442,238**	7,719,035	5,866,612	947,400
Cost of shares repurchased	**$ 1,531**	$ 1,021	$ 830	$ 151

d) General restrictions
The holders of the Common Shares are entitled to receive dividends as approved by the shareholders. Holders of Common Shares are allowed one vote per share provided that, if the controlled shares of any shareholder constitute ten percent or more of the outstanding Common Shares of Chubb, only a fraction of the vote will be allowed so as not to exceed ten percent in aggregate. Entry of acquirers of Common Shares as shareholders with voting rights in the share register may be refused if it would confer voting rights with respect to ten percent or more of the registered share capital recorded in the commercial register.

12. Share-based compensation

Chubb has share-based compensation plans which currently provide the Board the ability to grant awards of stock options, restricted stock, and restricted stock units to its employees and members of the Board.

In May 2016, our shareholders approved the Chubb Limited 2016 Long-Term Incentive Plan (the 2016 LTIP), which replaced both the ACE Limited 2004 LTIP (the 2004 LTIP) and The Chubb Corporation Long-Term Incentive Plan (2014). The 2016 LTIP is substantially similar to the 2004 LTIP in its operation and the types of awards that may be granted. Under the 2016 LTIP, Common Shares of Chubb were authorized to be issued pursuant to awards made as stock options, stock appreciation rights, performance shares, performance units, restricted stock, and restricted stock units.

Chubb principally issues restricted stock grants and stock options on a graded vesting schedule, with equal percentages of the award subject to vesting over a number of years (typically three or four). Chubb recognizes compensation cost for vesting of restricted stock and stock option grants with only service conditions on a straight-line basis over the requisite service period for each separately vesting portion of the award as if the award were, in-substance, multiple awards. We incorporate an estimate of future forfeitures in determining compensation cost for both grants of restricted stock and stock options.

In addition, Chubb grants performance-based restricted stock to certain executives that vest based on certain performance criteria as compared to a defined group of peer companies. Performance-based stock awards comprise target awards and premium awards that cliff vest at the end of a 3-year performance period based on both our tangible book value (shareholders' equity less goodwill and intangible assets, net of tax) per share growth and P&C combined ratio compared to our peer group. Premium awards are subject to an additional vesting provision based on total shareholder return (TSR) compared to our peer group. Shares representing target awards and premium awards are issued when the awards are approved and are subject to forfeiture, if applicable performance criteria are not met at the end of the 3-year performance period. Prior to January 2017, performance-based restricted stock awards had a 4-year vesting period with the potential to vest as to a portion each year, and excluded the P&C combined ratio and TSR additional vesting criteria.

Under the 2016 LTIP, 19,500,000 Common Shares are authorized to be issued. This is in addition to any shares that have not been delivered pursuant to the 2004 LTIP and remain available for grant pursuant to the 2004 LTIP and includes any shares covered by awards granted under the 2004 LTIP that have forfeited, expired or canceled after the effective date of the 2016 LTIP. At December 31, 2019, a total of 10,789,285 shares remain available for future issuance under the 2016 LTIP, which includes shares canceled or forfeited from the 2004 LTIP, in addition to common shares that were previously registered and authorized to be issued.

Under the Employee Stock Purchase Plan (ESPP), 6,500,000 shares are authorized to be issued. At December 31, 2019, a total of 1,785,978 shares remain available for issuance under the ESPP.

Chubb generally issues Common Shares for the exercise of stock options, restricted stock, and purchases under the ESPP from un-issued reserved shares (conditional share capital) and Common Shares in treasury.

The following table presents pre-tax and after-tax share-based compensation expense:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Stock options and shares issued under ESPP:			
Pre-tax	**$ 42**	$ 50	$ 41
After-tax [(1)]	**$ 39**	$ 40	$ 26
Restricted stock:			
Pre-tax	**$ 224**	$ 235	$ 259
After-tax	**$ 180**	$ 178	$ 151

(1) The windfall tax benefit recorded to Income tax expense in the Consolidated statement of operations was $12 million, $19 million, and $48 million for the years ended December 31, 2019, 2018, and 2017, respectively.

Unrecognized compensation expense related to the unvested portion of Chubb's employee share-based awards of restricted stock, restricted stock units, and stock options was $205 million at December 31, 2019 and is expected to be recognized over a weighted-average period of approximately 1 year.

Stock options
Both incentive and non-qualified stock options are principally granted at an option price per share equal to the grant date fair value of Chubb's Common Shares. Stock options are generally granted with a 3-year vesting period and a 10-year term. Stock options vest in equal annual installments over the respective vesting period, which is also the requisite service period.

Chubb's 2019 share-based compensation expense includes a portion of the cost related to the 2016 through 2019 stock option grants. Stock option fair value was estimated on the grant date using the Black-Scholes option-pricing model that uses the weighted-average assumptions noted below:

	Year Ended December 31		
	2019	2018	2017
Dividend yield	**2.2%**	2.0%	2.0%
Expected volatility	**16.0%**	23.2%	19.7%
Risk-free interest rate	**2.6%**	2.7%	2.0%
Expected life	**5.7 years**	5.7 years	5.8 years

The risk-free interest rate is based on the U.S. Treasury yield curve in effect at the time of grant. The expected life (estimated period of time from grant to exercise date) is estimated using the historical exercise behavior of employees. For year 2019, expected volatility is calculated as a blend of (a) historical volatility based on daily closing prices over a period equal to the expected life assumption and (b) implied volatility derived from Chubb's publicly traded options. For years 2018 and 2017, expected volatility was calculated as a blend of (a) historical volatility based on daily closing prices over a period equal to the expected life assumption, (b) long-term historical volatility based on daily closing prices over the period from Chubb's initial public trading date through the most recent quarter, and (c) implied volatility derived from Chubb's publicly traded options.

The following table presents a roll-forward of Chubb's stock options:

(Intrinsic Value in millions of U.S. dollars)	Number of Options	Weighted-Average Exercise Price	Weighted-Average Fair Value	Total Intrinsic Value
Options outstanding, December 31, 2016	10,180,720	$ 87.29		
Granted	2,079,522	$ 139.00	$ 22.97	
Exercised	(1,632,629)	$ 73.53		$ 111
Forfeited	(194,297)	$ 119.44		
Options outstanding, December 31, 2017	10,433,316	$ 99.20		
Granted	1,842,690	$ 143.07	$ 29.71	
Exercised	(1,065,384)	$ 73.57		$ 71
Forfeited	(202,900)	$ 133.92		
Options outstanding, December 31, 2018	11,007,722	$ 108.25		
Granted	2,073,940	$ 133.90	$ 18.76	
Exercised	(1,944,604)	$ 84.13		$ 122
Forfeited	(251,801)	$ 136.87		
Options outstanding, December 31, 2019	**10,885,257**	**$ 116.79**		**$ 423**
Options exercisable, December 31, 2019	**7,213,685**	**$ 106.26**		**$ 356**

The weighted-average remaining contractual term was 6.1 years for stock options outstanding and 4.8 years for stock options exercisable at December 31, 2019. Cash received from the exercise of stock options for the year ended December 31, 2019 was $163 million.

Restricted stock and restricted stock units
Grants of restricted stock and restricted stock units awarded under both the 2004 LTIP and 2016 LTIP typically have a 4-year vesting period, subject to vesting as to one-quarter of the award each anniversary of grant. Restricted stock and restricted stock units are granted at market close price on the day of grant. Each restricted stock unit represents our obligation to deliver to the holder one Common Share upon vesting.

Chubb also grants restricted stock awards to non-management directors which vest at the following year's annual general meeting.

Chubb's 2019 share-based compensation expense includes a portion of the cost related to the restricted stock granted in the years 2015 through 2019.

The following table presents a roll-forward of our restricted stock awards. Included in the roll-forward below are 19,019 restricted stock awards, 20,784 restricted stock awards, and 22,013 restricted stock awards that were granted to non-management directors during the years ended December 31, 2019, 2018, and 2017, respectively:

	Service-based Restricted Stock Awards and Restricted Stock Units			Performance-based Restricted Stock Awards and Restricted Stock Units		
	Number of Shares		Weighted-Average Grant-Date Fair Value	Number of Shares		Weighted-Average Grant-Date Fair Value
Unvested restricted stock, December 31, 2016	5,805,126	$	109.39	931,169	$	111.17
Granted	1,707,094	$	139.18	267,282	$	138.90
Vested	(2,646,084)	$	107.73	(222,954)	$	113.30
Forfeited	(156,694)	$	114.54	—	$	—
Unvested restricted stock, December 31, 2017	4,709,442	$	121.16	975,497	$	118.28
Granted	1,326,979	$	142.76	180,065	$	143.07
Vested	(2,545,090)	$	114.83	(244,332)	$	103.03
Forfeited	(196,482)	$	131.06	—	$	—
Unvested restricted stock, December 31, 2018	3,294,849	$	134.17	911,230	$	127.27
Granted	1,492,900	$	134.38	212,059	$	133.90
Vested	(1,292,864)	$	129.18	(196,640)	$	115.62
Forfeited	(200,875)	$	135.98	(50,437)	$	132.36
Unvested restricted stock, December 31, 2019	**3,294,010**	**$**	**136.20**	**876,212**	**$**	**131.16**

Prior to 2009, legacy ACE granted restricted stock units with a 1-year vesting period to non-management directors. Delivery of Common Shares on account of these restricted stock units to non-management directors is deferred until after the date of the non-management directors' termination from the Board. Legacy Chubb Corp historically allowed directors and certain key employees of Chubb Corp and its subsidiaries to defer a portion of their compensation earned with respect to services performed in the form of deferred stock units. In addition, legacy Chubb Corp provided supplemental retirement benefits for certain employees through its Defined Contribution Excess Benefit Plan in the form of deferred shares of stock. The minimum vesting period under these legacy Chubb Corp deferred plans was 1-year and the maximum was 3-years. Employees and directors had the option to elect to receive their awards at a future specified date or upon their termination of service with Chubb. At December 31, 2019, there were 201,666 deferred restricted stock units.

ESPP

The ESPP gives participating employees the right to purchase Common Shares through payroll deductions during consecutive subscription periods at a purchase price of 85 percent of the fair value of a Common Share on the exercise date (Purchase Price). Annual purchases by participants are limited to the number of whole shares that can be purchased by an amount equal to ten percent of the participant's compensation or $25,000, whichever is less. The ESPP has two six-month subscription periods each year, the first of which runs between January 1 and June 30 and the second of which runs between July 1 and December 31. The amounts collected from participants during a subscription period are used on the exercise date to purchase full shares of Common Shares. An exercise date is generally the last trading day of a subscription period. The number of shares purchased is equal to the total amount, at the exercise date, collected from the participants through payroll deductions for that subscription period, divided by the Purchase Price, rounded down to the next full share. Participants may withdraw from an offering before the exercise date and obtain a refund of amounts withheld through payroll deductions. Pursuant to the provisions of the ESPP, during the years ended December 31, 2019, 2018, and 2017, employees paid $41 million, $37 million, and $34 million to purchase 321,800 shares, 347,116 shares, and 271,185 shares, respectively.

13. Postretirement benefits

Chubb provides postretirement benefits to eligible employees and their dependents through various defined contribution plans sponsored by Chubb. In addition, for certain employees, Chubb sponsors other postretirement benefit plans, and prior to 2020, Chubb sponsored defined benefit pension plans.

Defined contribution plans (including 401(k))
Under these plans, employees' contributions may be supplemented by Chubb matching contributions based on the level of employee contribution. These contributions are invested at the election of each employee in one or more of several investment portfolios offered by a third-party investment advisor. Expenses for these plans totaled $171 million, $171 million, and $166 million for the years ended December 31, 2019, 2018, and 2017, respectively.

Defined benefit pension plans
We maintain non-contributory defined benefit pension plans that cover certain employees located in the U.S., U.K., Canada, and various other statutorily required countries. We account for pension benefits using the accrual method. Benefits under these plans are based on employees' years of service and compensation during final years of service. All underlying plans are subject to periodic actuarial valuations by qualified actuarial firms using actuarial models to calculate the expense and liability for each plan. We use December 31 as the measurement date for our defined benefit pension plans.

Under the Chubb Corp plans, prior to 2001, benefits were generally based on an employee’s years of service and average compensation during the last five years of employment. Effective January 1, 2001, the formula for providing pension benefits was changed from the final average pay formula to a cash balance formula. Under the cash balance formula, a notional account is established for each employee, which is credited semi-annually with an amount equal to a percentage of eligible compensation based on age and years of service plus interest based on the account balance. Chubb Corp employees hired prior to 2001 will generally be eligible to receive vested benefits based on the higher of the final average pay or cash balance formulas.

Other postretirement benefit plans
Our assumption of Chubb Corp's other postretirement benefit plans, principally healthcare and life insurance, covers retired employees, their beneficiaries, and covered dependents. Healthcare coverage is contributory. Retiree contributions vary based upon the retiree’s age, type of coverage, and years of service requirements. Life insurance coverage is non-contributory. Chubb funds a portion of the healthcare benefits obligation where such funding can be accomplished on a tax-effective basis. Benefits are paid as covered expenses are incurred.

Amendments to U.S. qualified and excess pension plans and U.S. retiree healthcare plan
On October 31, 2016, we harmonized and amended several of our U.S. retirement programs to create a unified retirement savings program. In 2020, we transitioned from a traditional defined benefit pension program that had been in effect for certain employees to a defined contribution program. Additionally, after 2025, we plan to eliminate a subsidized U.S. retiree healthcare and life insurance plan that had been in place for certain employees. Both amendments required a remeasurement of the plan assets and benefit obligations with updated assumptions, including discount rates and the expected return on assets. The amendment of the retiree healthcare plan resulted in a reduction in the obligation of $383 million, of which $410 million will be amortized as a reduction to expense through 2021 as it relates to benefits already accrued. For the years ended December 31, 2019, 2018, and 2017, $79 million, $80 million, and $89 million, respectively, were amortized as a reduction to expense. At December 31, 2019, the remaining curtailment benefit balance was $105 million which will be amortized as a reduction to expense over the next 1.5 years.

Obligations and funded status

The funded status of the pension and other postretirement benefit plans as well as the amounts recognized in Accumulated other comprehensive income at December 31, 2019 and 2018 was as follows:

	Pension Benefit Plans				Other Postretirement Benefit Plans	
	2019		2018		**2019**	2018
(in millions of U.S. dollars)	**U.S. Plans**	**Non-U.S. Plans**	U.S. Plans	Non-U.S. Plans		
Benefit obligation, beginning of year	**$ 3,092**	**$ 942**	$ 3,285	$ 1,077	**$ 113**	$ 137
Service cost	**49**	**11**	57	12	**—**	1
Interest cost	**118**	**27**	105	27	**4**	3
Actuarial loss (gain)	**443**	**124**	(214)	(71)	**3**	(20)
Benefits paid	**(121)**	**(39)**	(108)	(26)	**(17)**	(15)
Amendments	**—**	**—**	—	4	**—**	—
Curtailments	**—**	**(4)**	—	—	**—**	—
Settlements	**(12)**	**(61)**	(33)	(27)	**—**	—
Foreign currency revaluation and other	**—**	**42**	—	(54)	**—**	7
Benefit obligation, end of year	**$ 3,569**	**$ 1,042**	$ 3,092	$ 942	**$ 103**	$ 113
Plan assets at fair value, beginning of year	**$ 2,784**	**$ 1,008**	$ 3,109	$ 1,172	**$ 143**	$ 157
Actual return on plan assets	**636**	**169**	(218)	(63)	**9**	1
Employer contributions	**14**	**16**	34	14	**—**	—
Benefits paid	**(121)**	**(39)**	(108)	(26)	**—**	(15)
Settlements	**(12)**	**(61)**	(33)	(27)	**—**	—
Foreign currency revaluation and other	**—**	**48**	—	(62)	**—**	—
Plan assets at fair value, end of year	**$ 3,301**	**$ 1,141**	$ 2,784	$ 1,008	**$ 152**	$ 143
Funded status at end of year	**$ (268)**	**$ 99**	$ (308)	$ 66	**$ 49**	$ 30
Amounts recognized in Accumulated other comprehensive income, not yet recognized in net periodic cost (benefit):						
Net actuarial loss (gain)	**$ (21)**	**$ 110**	$ (15)	$ 112	**$ (3)**	$ —
Prior service cost (benefit)	**—**	**10**	—	9	**(114)**	(200)
Total	**$ (21)**	**$ 120**	$ (15)	$ 121	**$ (117)**	$ (200)

For the U.S. pension plans, the $443 million actuarial loss experienced in 2019 was principally driven by the decrease in the discount rate from 2018 that was used to determine the projected benefit obligation at December 31, 2019. The $214 million actuarial gain experienced in 2018 was largely driven by the increase in the discount rate from 2017 that was used to determine the projected benefit obligation at December 31, 2018.

The accumulated benefit obligation for the pension benefit plans was $4.6 billion and $4.0 billion at December 31, 2019 and 2018, respectively. The accumulated benefit obligation is the present value of pension benefits earned as of the measurement date based on employee service and compensation prior to that date. It differs from the pension (projected) benefit obligation in the table above in that the accumulated benefit obligation includes no assumptions regarding future compensation levels.

The net components of the funded status of the pension and other postretirement benefit plans are included in Accounts payable, accrued expenses, and other liabilities in the Consolidated balance sheets.

Chubb's funding policy is to contribute amounts that meet regulatory requirements plus additional amounts determined based on actuarial valuations, market conditions and other factors. All benefit plans satisfy minimum funding requirements of the Employee Retirement Income Security Act of 1974 (ERISA).

The following table provides information on pension plans where the benefit obligation is in excess of plan assets at December 31, 2019 and 2018:

	2019		2018	
(in millions of U.S. dollars)	U.S. Plans	Non-U.S. Plans	U.S. Plans	Non-U.S. Plans
Plans with projected benefit obligation in excess of plan assets:				
Projected benefit obligation	$ 3,569	$ 236	$ 3,092	$ 222
Fair value of plan assets	3,301	175	2,784	170
Net funded status	$ (268)	$ (61)	$ (308)	$ (52)
Plans with accumulated benefit obligation in excess of plan assets:				
Accumulated benefit obligation	$ 3,569	$ 173	$ 3,066	$ 115
Fair value of plan assets	$ 3,301	$ 140	$ 2,784	$ 86

For other postretirement benefit plans with an accumulated benefit obligation in excess of plan assets, the accumulated benefit obligation was $25 million and $23 million at December 31, 2019 and 2018, respectively. These plans have no plan assets.

At December 31, 2019, we estimate that we will contribute $23 million to the pension plans and $1 million to the other postretirement benefits plan in 2020. The estimate is subject to change due to contribution decisions that are affected by various factors including our liquidity, market performance and management discretion.

The weighted-average assumptions used to determine the projected benefit obligation were as follows:

	Pension Benefit Plans		
	U.S. Plans	Non-U.S. Plans	Other Postretirement Benefit Plans
December 31, 2019			
Discount rate	3.20%	2.39%	2.70%
Rate of compensation increase [(1)]	N/A	3.26%	N/A
Interest crediting rate	4.10%		
December 31, 2018			
Discount rate	4.20%	3.10%	3.78%
Rate of compensation increase	4.00%	3.37%	N/A
Interest crediting rate	4.10%		

(1) For the U.S. Pension Plans, benefit accruals were frozen as of December 31, 2019.

The projected benefit cash flows were discounted using the corresponding spot rates derived from a yield curve, which resulted in a single discount rate that would produce the same liability at the respective measurement dates. The same process was applied to service cost cash flows to determine the discount rate associated with the service cost. In general, the discount rates for the non-U.S. plans were developed using a similar methodology by using country-specific yield curves.

The components of net pension and other postretirement benefit costs reflected in Net income and other changes in plan assets and benefit obligations recognized in other comprehensive income were as follows:

	Pension Benefit Plans								
	U.S. Plans			Non-U.S. Plans			Other Postretirement Benefit Plans		
Year Ended December 31 (in millions of U.S. dollars)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Costs reflected in Net income:									
Service cost	**$ 49**	$ 57	$ 63	**$ 11**	$ 12	$ 17	**$ —**	$ 1	$ 2
Non-service cost:									
Interest cost	**118**	105	105	**27**	27	27	**4**	3	4
Expected return on plan assets	**(189)**	(212)	(189)	**(45)**	(50)	(42)	**(4)**	(5)	(5)
Amortization of net actuarial loss	**—**	—	—	**3**	1	3	**—**	—	—
Amortization of prior service cost	**—**	—	—	**—**	—	—	**(84)**	(85)	(89)
Curtailments	**—**	—	—	**(1)**	—	(27)	**—**	(2)	(37)
Settlements	**2**	2	—	**1**	3	—	**—**	—	—
Total non-service benefit	**(69)**	(105)	(84)	**(15)**	(19)	(39)	**(84)**	(89)	(127)
Net periodic benefit	**$ (20)**	$ (48)	$ (21)	**$ (4)**	$ (7)	$ (22)	**$ (84)**	$ (88)	$ (125)
Changes in plan assets and benefit obligations recognized in other comprehensive income									
Net actuarial loss (gain)	**$ (4)**	$ 214	$ (21)	**$ 6**	$ 34	$ (57)	**$ (2)**	$ (11)	$ (3)
Prior service cost (benefit)	**—**	—	—	**1**	3	—	**—**	—	(23)
Amortization of net actuarial loss	**—**	—	—	**(3)**	(1)	(3)	**—**	(1)	—
Amortization of prior service cost	**—**	—	—	**—**	—	—	**84**	85	89
Curtailments	**—**	—	—	**(3)**	—	(6)	**—**	3	39
Settlements	**(2)**	(2)	1	**(1)**	(3)	—	**—**	—	—
Total decrease (increase) in other comprehensive income	**$ (6)**	$ 212	$ (20)	**$ —**	$ 33	$ (66)	**$ 82**	$ 76	$ 102

The service and non-service cost components of net periodic (benefit) cost reflected in the Consolidated statements of operations were as follows:

	Pension Benefit Plans			Other Postretirement Benefit Plans		
Year Ended December 31 (in millions of U.S. dollars)	**2019**	2018	2017	**2019**	2018	2017
Service Cost:						
Losses and loss expenses	**$ 6**	$ 7	$ 7	**$ —**	$ —	$ —
Administrative expenses	**54**	62	73	**—**	1	2
Total service cost	**60**	69	80	**—**	1	2
Non-Service Cost:						
Losses and loss expenses	**(7)**	(10)	(8)	**(8)**	(9)	(13)
Administrative expenses	**(77)**	(114)	(115)	**(76)**	(80)	(114)
Total non-service benefit	**(84)**	(124)	(123)	**(84)**	(89)	(127)
Net periodic benefit	**$ (24)**	$ (55)	$ (43)	**$ (84)**	$ (88)	$ (125)

The weighted-average assumptions used to determine the net periodic pension and other postretirement benefit costs were as follows:

	Pension Benefit Plans		
Year Ended December 31	U.S. Plans	Non-U.S. Plans	Other Postretirement Benefit Plans
2019			
Discount rate in effect for determining service cost	**4.23%**	**4.48%**	**4.04%**
Discount rate in effect for determining interest cost	**3.94%**	**2.88%**	**3.69%**
Rate of compensation increase	**4.00%**	**3.37%**	**N/A**
Expected long-term rate of return on plan assets	**7.00%**	**4.40%**	**3.00%**
Interest crediting rate	**4.10%**	**N/A**	**N/A**
2018			
Discount rate in effect for determining service cost	3.62%	3.97%	2.84%
Discount rate in effect for determining interest cost	3.27%	2.55%	2.62%
Rate of compensation increase	4.00%	3.46%	N/A
Expected long-term rate of return on plan assets	7.00%	4.32%	2.59%
Interest crediting rate	4.10%	N/A	N/A
2017			
Discount rate in effect for determining service cost	4.20%	3.55%	2.84%
Discount rate in effect for determining interest cost	3.53%	2.61%	2.44%
Rate of compensation increase	4.00%	3.57%	N/A
Expected long-term rate of return on plan assets	7.00%	4.23%	3.00%
Interest crediting rate	4.10%	N/A	N/A

The weighted-average healthcare cost trend rate assumptions used to measure the expected cost of healthcare benefits were as follows:

	U.S. Plans			Non-U.S. Plans		
	2019	2018	2017	**2019**	2018	2017
Healthcare cost trend rate	**6.32%**	6.68%	7.01%	**5.24%**	6.29%	6.61%
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	**4.50%**	4.50%	4.50%	**4.00%**	4.50%	4.50%
Year that the rate reaches the ultimate trend rate	**2038**	2038	2038	**2040**	2029	2029

Plan Assets

The long term objective of the pension plan is to provide sufficient funding to cover expected benefit obligations, while assuming a prudent level of portfolio risk. The assets of the pension plan are invested, either directly or through pooled funds, in a diversified portfolio of predominately equity securities and fixed maturities. We seek to obtain a rate of return that over time equals or exceeds the returns of the broad markets in which the plan assets are invested. The target allocation of plan assets is 55 percent to 65 percent invested in equity securities (including certain other investments measured using NAV), with the remainder primarily invested in fixed maturities. We rebalance our pension assets to the target allocation as market conditions permit. We determined the expected long term rate of return assumption for each asset class based on an analysis of the historical returns and the expectations for future returns. The expected long term rate of return for the portfolio is a weighted aggregation of the expected returns for each asset class.

In order to minimize risk, the Plan maintains a listing of permissible and prohibited investments. In addition, the Plan has certain concentration limits and investment quality requirements imposed on permissible investments options. Investment risk is measured and monitored on an ongoing basis.

The following tables present the fair values of the pension plan assets, by valuation hierarchy. For additional information on how we classify these assets within the valuation hierarchy, refer to Note 4 to the Consolidated financial statements.

December 31, 2019				Pension Benefit Plans
(in millions of U.S. dollars)	**Level 1**	**Level 2**	**Level 3**	**Total**
U.S. Plans:				
Short-term investments	**$ 18**	**$ 37**	**$ —**	**$ 55**
U.S. Treasury and agency	**466**	**134**	**—**	**600**
Foreign and corporate bonds	**—**	**749**	**—**	**749**
States, municipalities, and political subdivisions	**—**	**2**	**—**	**2**
Equity securities	**1,467**	**—**	**—**	**1,467**
Total U.S. Plan assets (1)	**$ 1,951**	**$ 922**	**$ —**	**$ 2,873**
Non-U.S. Plans:				
Short-term investments	**$ 2**	**$ —**	**$ —**	**$ 2**
Foreign and corporate bonds	**—**	**598**	**—**	**598**
Equity securities	**112**	**318**	**—**	**430**
Total Non-U.S. Plan assets (1)	**$ 114**	**$ 916**	**$ —**	**$ 1,030**

(1) Excluded from the table above are $428 million and $107 million of other investments measured using NAV as a practical expedient related to the U.S. Plans and Non-U.S. Plans, respectively, and limited partnerships of $4 million in Non-U.S. Plans.

December 31, 2018				Pension Benefit Plans
(in millions of U.S. dollars)	Level 1	Level 2	Level 3	Total
U.S. Plans:				
Short-term investments	$ 10	$ 74	$ —	$ 84
U.S. Treasury and agency	433	82	—	515
Foreign and corporate bonds	—	641	—	641
Equity securities	1,050	—	—	1,050
Total U.S. Plan assets (1)	$ 1,493	$ 797	$ —	$ 2,290
Non-U.S. Plans:				
Short-term investments	$ 7	$ —	$ —	$ 7
Foreign and corporate bonds	—	418	—	418
Equity securities	103	371	—	474
Total Non-U.S. Plan assets (1)	$ 110	$ 789	$ —	$ 899

(1) Excluded from the table above are $494 million and $109 million of other investments measured using NAV as a practical expedient related to the U.S. Plans and Non-U.S. Plans, respectively.

The other postretirement benefit plan had $152 million and $143 million of other investments measured using NAV as a practical expedient at December 31, 2019 and 2018, respectively. Expected future benefit payments are as follows:

	Pension Benefit Plans		
For the years ending December 31 (in millions of U.S. dollars)	U.S. Plans	Non-U.S. Plans	Other Postretirement Benefit Plans
2020	$ 151	$ 27	$ 19
2021	157	28	21
2022	164	27	22
2023	169	29	18
2024	174	29	13
2025-2029	931	171	11

14. Other income and expense

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Equity in net income of partially-owned entities (1)	**$ 617**	$ 514	$ 418
Gains (losses) from fair value changes in separate account assets (2)	**44**	(38)	97
One-time contribution to the Chubb Charitable Foundation	**—**	—	(50)
Federal excise and capital taxes	**(23)**	(12)	(35)
Other	**(42)**	(30)	(30)
Total	**$ 596**	$ 434	$ 400

(1) Equity in net income of partially-owned entities includes $74 million, $43 million, and $3 million attributable to our investments in Huatai (Huatai Group, Huatai P&C, and Huatai Life) for the years ended December 31, 2019, 2018, and 2017, respectively.

(2) Related to gains (losses) from fair value changes in separate account assets that do not qualify for separate account reporting under GAAP.

Other income and expense includes equity in net income of partially-owned entities, which includes our share of net income or loss related to partially-owned investment companies (private equity) and partially-owned insurance companies. Also included in Other income and expense are gains (losses) from fair value changes in separate account assets that do not qualify for separate account reporting under GAAP. The offsetting movement in the separate account liabilities is included in Policy benefits in the Consolidated statements of operations. Certain federal excise and capital taxes incurred as a result of capital management initiatives are included in Other income and expense as these are considered capital transactions and are excluded from underwriting results.

15. Segment information

Chubb operates through six business segments: North America Commercial P&C Insurance, North America Personal P&C Insurance, North America Agricultural Insurance, Overseas General Insurance, Global Reinsurance, and Life Insurance. These segments distribute their products through various forms of brokers, agencies, and direct marketing programs. All business segments have established relationships with reinsurance intermediaries.

- The North America Commercial P&C Insurance segment includes the business written by Chubb divisions that provide property and casualty (P&C) insurance and services to large, middle market and small commercial businesses in the U.S., Canada, and Bermuda. This segment includes our retail divisions: Major Accounts, Commercial Insurance, including Small Commercial Insurance; and our wholesale and specialty divisions: Westchester and Chubb Bermuda. These divisions write a variety of coverages, including property, casualty, workers' compensation, package policies, risk management, financial lines, marine, construction, environmental, medical risk, cyber risk, surety, and excess casualty; as well as group accident and health (A&H) insurance.

- The North America Personal P&C Insurance segment includes the business written by Chubb Personal Risk Services division, which includes high net worth personal lines business, with operations in the U.S. and Canada. This segment provides affluent and high net worth individuals and families with homeowners, automobile and collector cars, valuable articles (including fine arts), personal and excess liability, travel insurance, and recreational marine insurance and services.

- The North America Agricultural Insurance segment includes the business written by Rain and Hail Insurance Service, Inc. in the U.S. and Canada, which provides comprehensive multiple peril crop insurance (MPCI) and crop-hail insurance, and Chubb Agribusiness, which offers farm and ranch property as well as specialty P&C coverages, including commercial agriculture products.

- The Overseas General Insurance segment includes the business written by two Chubb divisions that provide P&C insurance and services in the 51 countries and territories outside of North America where the company operates. Chubb International provides commercial P&C, A&H and traditional and specialty personal lines for large corporations, middle markets and small customers through retail brokers, agents and other channels locally around the world. Chubb Global Markets (CGM) provides commercial P&C excess and surplus lines and A&H through wholesale brokers in the London market and through Lloyd's. These divisions write a variety of coverages, including traditional commercial P&C, specialty categories such as financial lines, marine, energy, aviation, political risk and construction, as well as group A&H and traditional and specialty personal lines.
- The Global Reinsurance segment includes the reinsurance business written by Chubb Tempest Re, comprising Chubb Tempest Re Bermuda, Chubb Tempest Re USA, Chubb Tempest Re International, and Chubb Tempest Re Canada. Chubb Tempest Re provides a broad range of traditional and specialty reinsurance coverages to a diverse array of primary P&C companies, including small, mid-sized, and multinational ceding companies.
- The Life Insurance segment includes Chubb's international life operations written by Chubb Life, Chubb Tempest Life Re and the North American supplemental A&H and life business of Combined Insurance.

Corporate primarily includes the results of all run-off asbestos and environmental (A&E) exposures, our run-off Brandywine business, and our Westchester specialty operations for 1996 and prior years, and certain other non-A&E run-off exposures. In addition, Corporate includes the results of our non-insurance companies including Chubb Limited, Chubb Group Management and Holdings Ltd., and Chubb INA Holdings Inc. Our exposure to A&E claims principally arises out of liabilities acquired when we purchased Westchester Specialty in 1998, CIGNA's P&C business in 1999, and Chubb Corp in 2016.

In addition, revenue and expenses managed at the corporate level, including realized gains and losses, interest expense, the non-operating income of our partially-owned entities, and income taxes are reported within Corporate. Chubb integration expenses are also reported within Corporate. Chubb integration expenses are one-time costs that are directly attributable to the achievement of the annualized savings, including employee severance, third-party consulting fees, and systems integration expenses. These items will not be allocated to the segment level as they are one-time in nature and are not related to the ongoing business activities of the segment. The Chief Executive Officer does not manage segment results or allocate resources to segments when considering these costs and they are therefore excluded from our definition of segment income (loss). Therefore, segment income (loss) will only include underwriting income (loss), net investment income (loss), and other operating income and expense items such as each segment's share of the operating income (loss) related to partially-owned entities and miscellaneous income and expense items for which the segments are held accountable. Segment income (loss) also includes amortization of purchased intangibles related to business combination intangible assets acquired by the segment and other purchase accounting related intangible assets, including agency relationships, renewal rights, and client lists. The amortization of intangible assets purchased as part of the Chubb Corp acquisition is considered a Corporate cost as these are incurred by the overall company. We determined that this definition of segment income (loss) is appropriate and aligns with how the business is managed. We continue to evaluate our segments as our business continues to evolve and may further refine our segments and segment income (loss) measures.

For segment reporting purposes, certain items are presented in a different manner below than in the consolidated financial statements. Management uses underwriting income (loss) as the main measures of segment performance. Chubb calculates underwriting income (loss) by subtracting Losses and loss expenses, Policy benefits, Policy acquisition costs, and Administrative expenses from Net premiums earned. To calculate Segment income (loss), include Net investment income (loss), Other (income) expense, and Amortization expense of purchased intangibles. For the North America Agricultural Insurance segment, management includes gains and losses on crop derivatives as a component of underwriting income (loss). For example, for the year ended December 31, 2019, underwriting income in our North America Agricultural Insurance segment was $89 million. This amount includes $8 million of realized losses related to crop derivatives which are reported in Net realized gains (losses) including OTTI in the Corporate column below.

For the Life Insurance segment, management includes Net investment income (loss) and (Gains) losses from fair value changes in separate account assets that do not qualify for separate account reporting under GAAP as components of Life Insurance underwriting income (loss). For example, for the year ended December 31, 2019, Life Insurance underwriting income of $320 million includes Net investment income of $373 million and gains from fair value changes in separate account assets of $44 million. The gains from fair value changes in separate account assets are reported in Other (income) expense in the table below.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)
Chubb Limited and Subsidiaries

The following tables present the Statement of Operations by segment:

For the Year Ended December 31, 2019 (in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Life Insurance	Corporate	Chubb Consolidated
Net premiums written	$ 13,375	$ 4,787	$ 1,810	$ 9,262	$ 649	$ 2,392	$ —	$ 32,275
Net premiums earned	12,922	4,694	1,795	8,882	654	2,343	—	31,290
Losses and loss expenses	8,206	3,043	1,608	4,606	352	757	158	18,730
Policy benefits	—	—	—	—	—	740	—	740
Policy acquisition costs	1,831	948	84	2,501	169	620	—	6,153
Administrative expenses	1,028	286	6	1,033	35	323	319	3,030
Underwriting income (loss)	1,857	417	97	742	98	(97)	(477)	2,637
Net investment income (loss)	2,082	258	30	588	220	373	(125)	3,426
Other (income) expense	(3)	3	1	12	(58)	(92)	(459)	(596)
Amortization expense of purchased intangibles	—	12	28	45	—	2	218	305
Segment income (loss)	$ 3,942	$ 660	$ 98	$ 1,273	$ 376	$ 366	$ (361)	$ 6,354
Net realized gains (losses) including OTTI							(530)	(530)
Interest expense							552	552
Chubb integration expenses							23	23
Income tax expense							795	795
Net income (loss)							$ (2,261)	$ 4,454

For the Year Ended December 31, 2018 (in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Life Insurance	Corporate	Chubb Consolidated
Net premiums written	$ 12,485	$ 4,674	$ 1,577	$ 8,902	$ 671	$ 2,270	$ —	$ 30,579
Net premiums earned	12,402	4,593	1,569	8,612	670	2,218	—	30,064
Losses and loss expenses	8,000	3,229	1,111	4,429	479	766	53	18,067
Policy benefits	—	—	—	—	—	590	—	590
Policy acquisition costs	1,829	939	79	2,346	162	557	—	5,912
Administrative expenses	966	269	(9)	1,014	41	310	295	2,886
Underwriting income (loss)	1,607	156	388	823	(12)	(5)	(348)	2,609
Net investment income (loss)	2,033	236	28	619	257	341	(209)	3,305
Other (income) expense	(25)	1	2	—	(32)	26	(406)	(434)
Amortization expense of purchased intangibles	—	13	28	41	—	2	255	339
Segment income (loss)	$ 3,665	$ 378	$ 386	$ 1,401	$ 277	$ 308	$ (406)	$ 6,009
Net realized gains (losses) including OTTI							(652)	(652)
Interest expense							641	641
Chubb integration expenses							59	59
Income tax expense							695	695
Net income (loss)							$ (2,453)	$ 3,962

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)
Chubb Limited and Subsidiaries

For the Year Ended December 31, 2017 (in millions of U.S. dollars)	North America Commercial P&C Insurance	North America Personal P&C Insurance	North America Agricultural Insurance	Overseas General Insurance	Global Reinsurance	Life Insurance	Corporate	Chubb Consolidated
Net premiums written	$ 12,019	$ 4,533	$ 1,516	$ 8,350	$ 685	$ 2,141	$ —	$ 29,244
Net premiums earned	12,191	4,399	1,508	8,131	704	2,101	—	29,034
Losses and loss expenses	8,287	3,265	1,036	4,281	561	739	285	18,454
Policy benefits	—	—	—	—	—	676	—	676
Policy acquisition costs	1,873	899	81	2,221	177	530	—	5,781
Administrative expenses	981	264	(8)	982	44	303	267	2,833
Underwriting income (loss)	1,050	(29)	399	647	(78)	(147)	(552)	1,290
Net investment income (loss)	1,961	226	25	610	273	313	(283)	3,125
Other (income) expense	1	4	2	(4)	(1)	(84)	(318)	(400)
Amortization expense of purchased intangibles	—	16	29	45	—	2	168	260
Segment income (loss)	$ 3,010	$ 177	$ 393	$ 1,216	$ 196	$ 248	$ (685)	$ 4,555
Net realized gains (losses) including OTTI							84	84
Interest expense							607	607
Chubb integration expenses							310	310
Income tax benefit							(139)	(139)
Net income (loss)							$ (1,379)	$ 3,861

Underwriting assets are reviewed in total by management for purposes of decision-making. Other than Unpaid losses and loss expenses, Reinsurance recoverables, Goodwill and Other intangible assets, Chubb does not allocate assets to its segments.

The following table presents net premiums earned for each segment by line of business:

(in millions of U.S. dollars)	For the Year Ended December 31 2019	2018	2017
North America Commercial P&C Insurance			
Property & other short-tail lines	**$ 1,987**	$ 1,861	$ 1,899
Casualty & all other	**10,136**	9,773	9,554
A&H	**799**	768	738
Total North America Commercial P&C Insurance	**12,922**	12,402	12,191
North America Personal P&C Insurance			
Personal automobile	**829**	803	742
Personal homeowners	**3,183**	3,127	3,014
Personal other	**682**	663	643
Total North America Personal P&C Insurance	**4,694**	4,593	4,399
North America Agricultural Insurance	**1,795**	1,569	1,508
Overseas General Insurance			
Property & other short-tail lines	**2,244**	2,134	2,076
Casualty & all other	**2,494**	2,429	2,266
Personal lines	**1,896**	1,784	1,609
A&H	**2,248**	2,265	2,180
Total Overseas General Insurance	**8,882**	8,612	8,131
Global Reinsurance			
Property & other short-tail lines	**131**	123	132
Property catastrophe	**142**	170	198
Casualty & all other	**381**	377	374
Total Global Reinsurance	**654**	670	704
Life Insurance			
Life	**1,101**	1,022	980
A&H	**1,242**	1,196	1,121
Total Life Insurance	**2,343**	2,218	2,101
Total net premiums earned	**$ 31,290**	$ 30,064	$ 29,034

The following table presents net premiums earned by geographic region. Allocations have been made on the basis of location of risk:

	North America	Europe (1)	Asia Pacific / Far East	Latin America
2019	**70%**	**11%**	**12%**	**7%**
2018	70%	11%	12%	7%
2017	70%	11%	12%	7%

(1) Europe includes Eurasia and Africa regions.

16. Earnings per share

(in millions of U.S. dollars, except share and per share data)	2019	2018	2017
	Year Ended December 31		
Numerator:			
Net income	**$ 4,454**	$ 3,962	$ 3,861
Denominator:			
Denominator for basic earnings per share:			
Weighted-average shares outstanding	**455,910,463**	463,629,203	467,145,716
Denominator for diluted earnings per share:			
Share-based compensation plans	**3,004,200**	3,173,145	4,051,185
Weighted-average shares outstanding and assumed conversions	**458,914,663**	466,802,348	471,196,901
Basic earnings per share	**$ 9.77**	$ 8.55	$ 8.26
Diluted earnings per share	**$ 9.71**	$ 8.49	$ 8.19
Potential anti-dilutive share conversions	**2,410,337**	3,543,188	1,776,025

Excluded from weighted-average shares outstanding and assumed conversions is the impact of securities that would have been anti-dilutive during the respective years.

17. Related party transactions

Starr Indemnity & Liability Company and its affiliates (collectively, Starr)
We have a number of agency and reinsurance agreements with Starr, the Chairman of which is related to a member of our senior management team. The Board has reviewed and approved our arrangements with Starr. We have agency, claims services and underwriting services agreements with various Starr subsidiaries. Under the agency agreements, we secure the ability to sell our insurance policies through Starr as one of our non-exclusive agents for writing policies, contracts, binders, or agreements of insurance or reinsurance. Under the claims services agreements, Starr adjusts the claims under policies and arranges for third party treaty and facultative agreements covering such policies. Under the underwriting services agreements, Starr underwrites insurance policies on our behalf and we agree to reinsure such policies to Starr under one or more quota reinsurance agreements.

Certain agency agreements also contain a profit-sharing arrangement based on loss ratios, triggered if Starr underwrites a minimum of $20 million of annual program business net premiums written on our behalf. No profit share commission has been payable yet under this arrangement. Another agency agreement contains a profit-sharing arrangement based on the earned premiums for the business underwritten by Starr (excluding workers' compensation) and the reinsurance recoveries associated with excess of loss reinsurance agreements placed by Starr for the business underwritten. No profit share commission under this arrangement has been payable yet. Transactions generated under Starr agreements were as follows:

(in millions of U.S. dollars)	2019	2018	2017
	Year Ended December 31		
Consolidated statement of operations			
Gross premiums written	**$ 394**	$ 411	$ 464
Ceded premiums written	**$ 207**	$ 188	$ 175
Commissions paid	**$ 77**	$ 84	$ 101
Commissions received	**$ 46**	$ 42	$ 37
Losses and loss expenses incurred	**$ 185**	$ 188	$ 438
Consolidated balance sheets			
Reinsurance recoverable on losses and loss expenses	**$ 440**	$ 514	
Ceded reinsurance premium payable	**$ 56**	$ 75	

ABR Re

We own 12.2 percent of the common equity of ABR Reinsurance Capital Holdings Ltd. and warrants to acquire 0.5 percent of additional equity. ABR Reinsurance Capital Holdings Ltd., is the parent company of ABR Reinsurance Ltd. (ABR Re), an independent reinsurance company. Through long-term arrangements, Chubb will be the sole source of reinsurance risks ceded to ABR Re, and BlackRock, Inc. will be ABR Re's exclusive investment management service provider. As an investor, Chubb is expected to benefit from underwriting profit generated by ABR Re's reinsuring a wide range of Chubb's primary insurance business and the income and capital appreciation BlackRock, Inc. seeks to deliver through its investment management services. In addition, Chubb has entered into an arrangement with BlackRock, Inc. under which both Chubb and BlackRock, Inc. will be entitled to an equal share of the aggregate amount of certain fees, including underwriting and investment management performance related fees, in connection with their respective reinsurance and investment management arrangements with ABR Re.

ABR Re is a variable interest entity; however, Chubb is not the primary beneficiary and does not consolidate ABR Re because Chubb does not have the power to control and direct ABR Re's most significant activities, including investing and underwriting. Our minority ownership interest is accounted for under the equity method of accounting. Chubb cedes premiums to ABR Re and recognizes the associated commissions.

Transactions generated under ABR Re agreements were as follows:

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Consolidated statement of operations			
Ceded premiums written	**$ 321**	$ 329	$ 342
Commissions received	**$ 92**	$ 96	$ 94
Consolidated balance sheets			
Reinsurance recoverable on losses and loss expenses	**$ 674**	$ 557	
Ceded reinsurance premium payable	**$ 62**	$ 47	

18. Statutory financial information

Our subsidiaries file financial statements prepared in accordance with statutory accounting practices prescribed or permitted by insurance regulators. Statutory accounting differs from GAAP in the reporting of certain reinsurance contracts, investments, subsidiaries, acquisition expenses, fixed assets, deferred income taxes, and certain other items. Some jurisdictions impose complex regulatory requirements on insurance companies while other jurisdictions impose fewer requirements. In some jurisdictions, we must obtain licenses issued by governmental authorities to conduct local insurance business. These licenses may be subject to reserves and minimum capital and solvency tests. Jurisdictions may impose fines, censure, and/or criminal sanctions for violation of regulatory requirements. The 2019 amounts below are based on estimates.

Chubb's insurance and reinsurance subsidiaries are subject to insurance laws and regulations in the jurisdictions in which they operate. 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 local insurance regulatory authorities. The amount of dividends available to be paid in 2020 without prior approval totals $6.5 billion.

The statutory capital and surplus of our insurance subsidiaries met regulatory requirements for 2019, 2018, and 2017. The minimum amounts of statutory capital and surplus necessary to satisfy regulatory requirements was $26.3 billion and $24.2 billion for December 31, 2019 and 2018, respectively. These minimum regulatory capital requirements were significantly lower than the corresponding amounts required by the rating agencies which review Chubb’s insurance and reinsurance subsidiaries.

The following tables present the combined statutory capital and surplus and statutory net income (loss) of our Property and casualty and Life subsidiaries:

	December 31	
(in millions of U.S. dollars)	**2019**	2018
Statutory capital and surplus		
Property and casualty	**$ 43,684**	$ 40,780
Life	**$ 1,900**	$ 1,279

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Statutory net income (loss)			
Property and casualty	**$ 5,931**	$ 7,521	$ 8,178
Life	**$ (227)**	$ (102)	$ 49

Several insurance subsidiaries follow accounting practices prescribed or permitted by the jurisdiction of domicile that differ from the applicable local statutory practice. The application of prescribed or permitted accounting practices does not have a material impact on Chubb's statutory surplus and income. As prescribed by the Restructuring discussed previously in Note 7, certain of our U.S. subsidiaries discount certain A&E liabilities, which increased statutory capital and surplus by approximately $147 million and $160 million at December 31, 2019 and 2018, respectively.

Federal Insurance Company (Federal), a direct subsidiary of Chubb INA Holdings Inc., has a permitted practice granted by the Indiana Department of Insurance that relates to its investments in foreign subsidiaries and affiliates. Under Statement of Statutory Accounting Principles No. 97, Investments in Subsidiary, Controlled and Affiliated Entities, A Replacement of SSAP No. 88, in order for a reporting entity to admit its investments in foreign subsidiaries and affiliates, audited financial statements of the subsidiary or affiliate must be obtained to support the carrying value. Such financial statements must be prepared in accordance with U.S. GAAP, or alternatively, in accordance with the local statutory requirements in the subsidiary’s or affiliate’s country of domicile, with an audited footnote reconciliation of net income and shareholder’s equity as reported to a U.S. GAAP basis. With the explicit permission of the Indiana Department of Insurance, Federal obtains audited financial statements for its admitted foreign subsidiaries and affiliates, which had an aggregate carrying value of approximately $54 million and $178 million at December 31, 2019 and 2018, respectively, prepared in accordance with their respective local statutory requirements and supplemented with a separate unaudited reconciliation of shareholder’s equity as reported to a U.S. GAAP basis.

19. Information provided in connection with outstanding debt of subsidiaries

The following tables present condensed consolidating financial information at December 31, 2019 and December 31, 2018, and for the years ended December 31, 2019, 2018, and 2017 for Chubb Limited (Parent Guarantor) and Chubb INA Holdings Inc. (Subsidiary Issuer). The Subsidiary Issuer is an indirect 100 percent-owned subsidiary of the Parent Guarantor. The Parent Guarantor fully and unconditionally guarantees certain of the debt of the Subsidiary Issuer. Condensed consolidating financial information of the Parent Guarantor and Subsidiary Issuer are presented on the equity method of accounting. The revenues and expenses and cash flows of the subsidiaries of the Subsidiary Issuer are presented in the Other Chubb Limited Subsidiaries column on a combined basis.

Condensed Consolidating Balance Sheet at December 31, 2019

(in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Assets					
Investments	$ —	$ 1,013	$ 108,221	$ —	$ 109,234
Cash [1]	2	442	1,093	—	1,537
Restricted Cash	—	—	109	—	109
Insurance and reinsurance balances receivable	—	—	12,920	(2,563)	10,357
Reinsurance recoverable on losses and loss expenses	—	—	24,780	(9,599)	15,181
Reinsurance recoverable on policy benefits	—	—	292	(95)	197
Value of business acquired	—	—	306	—	306
Goodwill and other intangible assets	—	—	21,359	—	21,359
Investments in subsidiaries	50,853	52,076	—	(102,929)	—
Due from subsidiaries and affiliates, net	4,776	—	—	(4,776)	—
Other assets	12	408	20,072	(1,829)	18,663
Total assets	$ 55,643	$ 53,939	$ 189,152	$ (121,791)	$ 176,943
Liabilities					
Unpaid losses and loss expenses	$ —	$ —	$ 71,916	$ (9,226)	$ 62,690
Unearned premiums	—	—	17,978	(1,207)	16,771
Future policy benefits	—	—	5,909	(95)	5,814
Due to subsidiaries and affiliates, net	—	4,446	330	(4,776)	—
Repurchase agreements	—	—	1,416	—	1,416
Short-term debt	—	1,298	1	—	1,299
Long-term debt	—	13,559	—	—	13,559
Trust preferred securities	—	308	—	—	308
Other liabilities	312	1,649	21,352	(3,558)	19,755
Total liabilities	312	21,260	118,902	(18,862)	121,612
Total shareholders’ equity	55,331	32,679	70,250	(102,929)	55,331
Total liabilities and shareholders’ equity	$ 55,643	$ 53,939	$ 189,152	$ (121,791)	$ 176,943

(1) Chubb maintains two notional multicurrency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information.

Subsequent Events
In January 2020, Chubb INA Holdings Inc. paid $1.5 billion towards the series of intercompany loans involving its parents, Chubb Group Holdings Inc. and Chubb Limited. Additionally, Chubb Limited contributed $1.2 billion to a subsidiary included in Other Chubb Limited Subsidiaries.

Condensed Consolidating Balance Sheet at December 31, 2018

(in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Assets					
Investments	$ —	$ 214	$ 100,754	$ —	$ 100,968
Cash (1)	1	2	1,896	(652)	1,247
Restricted Cash	—	—	93	—	93
Insurance and reinsurance balances receivable	—	—	11,861	(1,786)	10,075
Reinsurance recoverable on losses and loss expenses	—	—	26,422	(10,429)	15,993
Reinsurance recoverable on policy benefits	—	—	306	(104)	202
Value of business acquired	—	—	295	—	295
Goodwill and other intangible assets	—	—	21,414	—	21,414
Investments in subsidiaries	43,531	50,209	—	(93,740)	—
Due from subsidiaries and affiliates, net	7,074	—	598	(7,672)	—
Other assets	3	1,007	18,102	(1,628)	17,484
Total assets	$ 50,609	$ 51,432	$ 181,741	$ (116,011)	$ 167,771
Liabilities					
Unpaid losses and loss expenses	$ —	$ —	$ 72,857	$ (9,897)	$ 62,960
Unearned premiums	—	—	16,611	(1,079)	15,532
Future policy benefits	—	—	5,610	(104)	5,506
Due to subsidiaries and affiliates, net	—	7,672	—	(7,672)	—
Affiliated notional cash pooling programs (1)	35	617	—	(652)	—
Repurchase agreements	—	—	1,418	—	1,418
Short-term debt	—	500	9	—	509
Long-term debt	—	12,086	1	—	12,087
Trust preferred securities	—	308	—	—	308
Other liabilities	262	2,545	19,199	(2,867)	19,139
Total liabilities	297	23,728	115,705	(22,271)	117,459
Total shareholders' equity	50,312	27,704	66,036	(93,740)	50,312
Total liabilities and shareholders' equity	$ 50,609	$ 51,432	$ 181,741	$ (116,011)	$ 167,771

(1) Chubb maintains two notional multicurrency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information. At December 31, 2018, the cash balance of one or more entities was negative; however, the overall Pool balances were positive.

Condensed Consolidating Statements of Operations and Comprehensive Income

For the Year Ended December 31, 2019 (in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Net premiums written	$ —	$ —	$ 32,275	$ —	$ 32,275
Net premiums earned	—	—	31,290	—	31,290
Net investment income	1	(15)	3,440	—	3,426
Equity in earnings of subsidiaries	4,307	3,022	—	(7,329)	—
Net realized gains (losses) including OTTI	(17)	(31)	(482)	—	(530)
Losses and loss expenses	—	—	18,730	—	18,730
Policy benefits	—	—	740	—	740
Policy acquisition costs and administrative expenses	92	(26)	9,117	—	9,183
Interest (income) expense	(243)	705	90	—	552
Other (income) expense	(27)	6	(575)	—	(596)
Amortization of purchased intangibles	—	—	305	—	305
Chubb integration expenses	1	2	20	—	23
Income tax expense (benefit)	14	(175)	956	—	795
Net income	$ 4,454	$ 2,464	$ 4,865	$ (7,329)	$ 4,454
Comprehensive income	$ 7,521	$ 4,988	$ 7,922	$ (12,910)	$ 7,521

Condensed Consolidating Statements of Operations and Comprehensive Income (Loss)

For the Year Ended December 31, 2018 (in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Net premiums written	$ —	$ —	$ 30,579	$ —	$ 30,579
Net premiums earned	—	—	30,064	—	30,064
Net investment income	6	13	3,286	—	3,305
Equity in earnings of subsidiaries	3,753	2,578	—	(6,331)	—
Net realized gains (losses) including OTTI	—	117	(769)	—	(652)
Losses and loss expenses	—	—	18,067	—	18,067
Policy benefits	—	—	590	—	590
Policy acquisition costs and administrative expenses	87	(58)	8,769	—	8,798
Interest (income) expense	(299)	806	134	—	641
Other (income) expense	(24)	26	(436)	—	(434)
Amortization of purchased intangibles	—	—	339	—	339
Chubb integration expenses	14	1	44	—	59
Income tax expense (benefit)	19	(148)	824	—	695
Net income	$ 3,962	$ 2,081	$ 4,250	$ (6,331)	$ 3,962
Comprehensive income (loss)	$ 1,242	$ (27)	$ 1,808	$ (1,781)	$ 1,242

Condensed Consolidating Statements of Operations and Comprehensive Income

For the Year Ended December 31, 2017 (in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Net premiums written	$ —	$ —	$ 29,244	$ —	$ 29,244
Net premiums earned	—	—	29,034	—	29,034
Net investment income	4	14	3,107	—	3,125
Equity in earnings of subsidiaries	3,640	2,424	—	(6,064)	—
Net realized gains (losses) including OTTI	—	(25)	109	—	84
Losses and loss expenses	—	—	18,454	—	18,454
Policy benefits	—	—	676	—	676
Policy acquisition costs and administrative expenses	75	40	8,499	—	8,614
Interest (income) expense	(332)	847	92	—	607
Other (income) expense	(12)	93	(481)	—	(400)
Amortization of purchased intangibles	—	—	260	—	260
Chubb integration expenses	32	69	209	—	310
Income tax expense (benefit)	20	(742)	583	—	(139)
Net income	$ 3,861	$ 2,106	$ 3,958	$ (6,064)	$ 3,861
Comprehensive income	$ 4,718	$ 3,075	$ 4,430	$ (7,505)	$ 4,718

Condensed Consolidating Statement of Cash Flows

For the Year Ended December 31, 2019 (in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Net cash flows from operating activities	**$ 412**	**$ 2,926**	**$ 6,878**	**$ (3,874)**	**$ 6,342**
Cash flows from investing activities					
Purchases of fixed maturities available for sale	—	(21)	(25,825)	—	(25,846)
Purchases of fixed maturities held to maturity	—	—	(229)	—	(229)
Purchases of equity securities	—	—	(531)	—	(531)
Sales of fixed maturities available for sale	—	1	13,115	—	13,116
Sales of equity securities	—	—	611	—	611
Maturities and redemptions of fixed maturities available for sale	—	41	8,998	—	9,039
Maturities and redemptions of fixed maturities held to maturity	—	—	946	—	946
Net change in short-term investments	—	(808)	(309)	—	(1,117)
Net derivative instruments settlements	—	(74)	(629)	—	(703)
Private equity contribution	—	—	(1,315)	—	(1,315)
Private equity distribution	—	—	1,390	—	1,390
Capital contribution	(1,000)	(110)	—	1,110	—
Acquisition of subsidiaries (net of cash acquired of $45)	—	—	(29)	—	(29)
Other	—	(4)	(1,233)	—	(1,237)
Net cash flows used for investing activities	(1,000)	(975)	(5,040)	1,110	(5,905)
Cash flows from financing activities					
Dividends paid on Common Shares	(1,354)	—	—	—	(1,354)
Common Shares repurchased	(327)	—	(1,203)	—	(1,530)
Proceeds from issuance of long-term debt	—	2,828	—	—	2,828
Proceeds from issuance of repurchase agreements	—	—	2,817	—	2,817
Repayment of long-term debt	—	(500)	(10)	—	(510)
Repayment of repurchase agreements	—	—	(2,817)	—	(2,817)
Proceeds from share-based compensation plans	—	—	204	—	204
Advances (to) from affiliates	2,301	(3,223)	922	—	—
Dividends to parent company	—	—	(3,874)	3,874	—
Capital contribution	—	—	1,110	(1,110)	—
Net payments to affiliated notional cash pooling programs(1)	(35)	(617)	—	652	—
Policyholder contract deposits	—	—	514	—	514
Policyholder contract withdrawals	—	—	(303)	—	(303)
Net cash flows from (used for) financing activities	585	(1,512)	(2,640)	3,416	(151)
Effect of foreign currency rate changes on cash and restricted cash	4	1	15	—	20
Net increase (decrease) in cash and restricted cash	1	440	(787)	652	306
Cash and restricted cash – beginning of year (1)	1	2	1,989	(652)	1,340
Cash and restricted cash – end of year (1)	$ 2	$ 442	$ 1,202	$ —	$ 1,646

(1) Chubb maintains two notional multi-currency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information. At December 31, 2018, the cash balance of one or more entities was negative; however, the overall Pool balances were positive.

Condensed Consolidating Statement of Cash Flows

For the Year Ended December 31, 2018 (in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Net cash flows from operating activities	$ 256	$ 4,654	$ 5,878	$ (5,308)	$ 5,480
Cash flows from investing activities					
Purchases of fixed maturities available for sale	—	(38)	(24,697)	—	(24,735)
Purchases of fixed maturities held to maturity	—	—	(456)	—	(456)
Purchases of equity securities	—	—	(207)	—	(207)
Sales of fixed maturities available for sale	—	11	14,019	—	14,030
Sales of equity securities	—	—	315	—	315
Maturities and redemptions of fixed maturities available for sale	—	17	7,335	—	7,352
Maturities and redemptions of fixed maturities held to maturity	—	—	1,124	—	1,124
Net change in short-term investments	—	3	513	—	516
Net derivative instruments settlements	—	(7)	23	—	16
Private equity contributions	—	—	(1,337)	—	(1,337)
Private equity distributions	—	—	980	—	980
Capital contribution	(1,475)	(3,550)	—	5,025	—
Other	—	(18)	(515)	—	(533)
Net cash flows used for investing activities	(1,475)	(3,582)	(2,903)	5,025	(2,935)
Cash flows from financing activities					
Dividends paid on Common Shares	(1,337)	—	—	—	(1,337)
Common Shares repurchased	—	—	(1,044)	—	(1,044)
Proceeds from issuance of long-term debt	—	2,171	—	—	2,171
Proceeds from issuance of repurchase agreements	—	—	2,029	—	2,029
Repayment of long-term debt	—	(2,000)	(1)	—	(2,001)
Repayment of repurchase agreements	—	—	(2,019)	—	(2,019)
Proceeds from share-based compensation plans	—	—	115	—	115
Advances (to) from affiliates	2,519	(1,744)	(775)	—	—
Dividends to parent company	—	—	(5,308)	5,308	—
Capital contribution	—	—	5,025	(5,025)	—
Net payments to affiliated notional cash pooling programs(1)	35	502	—	(537)	—
Policyholder contract deposits	—	—	453	—	453
Policyholder contract withdrawals	—	—	(358)	—	(358)
Net cash flows from (used for) financing activities	1,217	(1,071)	(1,883)	(254)	(1,991)
Effect of foreign currency rate changes on cash and restricted cash	—	—	(65)	—	(65)
Net increase (decrease) in cash and restricted cash	(2)	1	1,027	(537)	489
Cash and restricted cash – beginning of year (1)	3	1	962	(115)	851
Cash and restricted cash – end of year (1)	$ 1	$ 2	$ 1,989	$ (652)	$ 1,340

(1) Chubb maintains two notional multi-currency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information. At December 31, 2018 and 2017, the cash balance of one or more entities was negative; however, the overall Pool balances were positive.

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Condensed Consolidating Statement of Cash Flows

For the Year Ended December 31, 2017 (in millions of U.S. dollars)	Chubb Limited (Parent Guarantor)	Chubb INA Holdings Inc. (Subsidiary Issuer)	Other Chubb Limited Subsidiaries	Consolidating Adjustments and Eliminations	Chubb Limited Consolidated
Net cash flows from operating activities	$ 781	$ 1,648	$ 4,598	$ (2,524)	$ 4,503
Cash flows from investing activities					
Purchases of fixed maturities available for sale	—	(9)	(25,738)	—	(25,747)
Purchases of fixed maturities held to maturity	—	—	(352)	—	(352)
Purchases of equity securities	—	—	(173)	—	(173)
Sales of fixed maturities available for sale	—	99	13,156	—	13,255
Sales of equity securities	—	—	187	—	187
Maturities and redemptions of fixed maturities available for sale	—	29	10,396	—	10,425
Maturities and redemptions of fixed maturities held to maturity	—	—	879	—	879
Net change in short-term investments	—	189	(726)	—	(537)
Net derivative instruments settlements	—	(15)	(250)	—	(265)
Private equity contributions	—	—	(648)	—	(648)
Private equity distributions	—	—	1,084	—	1,084
Other	—	(10)	(520)	—	(530)
Net cash flows from (used for) investing activities	—	283	(2,705)	—	(2,422)
Cash flows from financing activities					
Dividends paid on Common Shares	(1,308)	—	—	—	(1,308)
Common Shares repurchased	—	—	(801)	—	(801)
Proceeds from issuance of long-term debt	—	—	—	—	—
Proceeds from issuance of repurchase agreements	—	—	2,353	—	2,353
Repayment of long-term debt	—	(500)	(1)	—	(501)
Repayment of repurchase agreements	—	—	(2,348)	—	(2,348)
Proceeds from share-based compensation plans	—	—	151	—	151
Advances (to) from affiliates	892	(927)	35	—	—
Dividends to parent company	—	—	(2,524)	2,524	—
Net payments to affiliated notional cash pooling programs(1)	(363)	(504)	—	867	—
Policyholder contract deposits	—	—	442	—	442
Policyholder contract withdrawals	—	—	(307)	—	(307)
Net cash flows used for financing activities	(779)	(1,931)	(3,000)	3,391	(2,319)
Effect of foreign currency rate changes on cash and restricted cash	—	—	1	—	1
Net increase (decrease) in cash and restricted cash	2	—	(1,106)	867	(237)
Cash and restricted cash – beginning of year (1)	1	1	2,068	(982)	1,088
Cash and restricted cash – end of year (1)	$ 3	$ 1	$ 962	$ (115)	$ 851

(1) Chubb maintains two notional multi-currency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information. At December 31, 2017 and 2016, the cash balance of one or more entities was negative; however, the overall Pool balances were positive.

20. Condensed unaudited quarterly financial data

	Three Months Ended			
(in millions of U.S. dollars, except per share data)	March 31 2019	June 30 2019	September 30 2019	December 31 2019
Net premiums earned	**$ 7,137**	**$ 7,891**	**$ 8,327**	**$ 7,935**
Net investment income	**836**	**859**	**873**	**858**
Net realized gains (losses) including OTTI losses	**(97)**	**(223)**	**(155)**	**(55)**
Total revenues	**$ 7,876**	**$ 8,527**	**$ 9,045**	**$ 8,738**
Losses and loss expenses	**$ 4,098**	**$ 4,715**	**$ 5,052**	**$ 4,865**
Policy benefits	**$ 196**	**$ 161**	**$ 158**	**$ 225**
Net income	**$ 1,040**	**$ 1,150**	**$ 1,091**	**$ 1,173**
Basic earnings per share	**$ 2.27**	**$ 2.52**	**$ 2.40**	**$ 2.59**
Diluted earnings per share	**$ 2.25**	**$ 2.50**	**$ 2.38**	**$ 2.57**

	Three Months Ended			
(in millions of U.S. dollars, except per share data)	March 31 2018	June 30 2018	September 30 2018	December 31 2018
Net premiums earned	$ 7,027	$ 7,664	$ 7,908	$ 7,465
Net investment income	806	828	823	848
Net realized gains (losses) including OTTI losses	(2)	18	19	(687)
Total revenues	$ 7,831	$ 8,510	$ 8,750	$ 7,626
Losses and loss expenses	$ 4,102	$ 4,487	$ 4,868	$ 4,610
Policy benefits	$ 151	$ 150	$ 127	$ 162
Net income	$ 1,082	$ 1,294	$ 1,231	$ 355
Basic earnings per share	$ 2.32	$ 2.78	$ 2.66	$ 0.77
Diluted earnings per share	$ 2.30	$ 2.76	$ 2.64	$ 0.76

Net income for the three months ended December 31, 2018 included after-tax catastrophe losses of $506 million.

SCHEDULE I
Chubb Limited and Subsidiaries

SUMMARY OF INVESTMENTS – OTHER THAN INVESTMENTS IN RELATED PARTIES

December 31, 2019 (in millions of U.S. dollars)	Cost or Amortized Cost	Fair Value	Amount at Which Shown in the Balance Sheet
Fixed maturities available for sale			
U.S. Treasury and agency	$ 3,188	$ 3,283	$ 3,283
Foreign	22,670	23,707	23,707
Corporate securities	30,689	31,791	31,791
Mortgage-backed securities	18,712	19,192	19,192
States, municipalities, and political subdivisions	7,321	7,515	7,515
Total fixed maturities available for sale	82,580	85,488	85,488
Fixed maturities held to maturity			
U.S. Treasury and agency	1,318	1,347	1,318
Foreign	1,423	1,485	1,423
Corporate securities	2,349	2,468	2,349
Mortgage-backed securities	2,331	2,396	2,331
States, municipalities, and political subdivisions	5,160	5,309	5,160
Total fixed maturities held to maturity	12,581	13,005	12,581
Equity securities			
Industrial, miscellaneous, and all other	812	812	812
Short-term investments	4,291	4,291	4,291
Other investments (1)	5,915	5,915	5,915
Total investments - other than investments in related parties	$ 106,179	$ 109,511	$ 109,087

(1) Excludes $147 million of related party investments.

SCHEDULE II
Chubb Limited and Subsidiaries

CONDENSED FINANCIAL INFORMATION OF REGISTRANT

BALANCE SHEETS (Parent Company Only)

(in millions of U.S. dollars)	December 31 2019	December 31 2018
Assets		
Investments in subsidiaries and affiliates on equity basis	$ 50,853	$ 43,531
Total investments	50,853	43,531
Cash	2	1
Due from subsidiaries and affiliates, net	4,776	7,074
Other assets	12	3
Total assets	$ 55,643	$ 50,609
Liabilities		
Affiliated notional cash pooling programs (1)	$ —	$ 35
Accounts payable, accrued expenses, and other liabilities	312	262
Total liabilities	312	297
Shareholders' equity		
Common Shares	11,121	11,121
Common Shares in treasury	(3,754)	(2,618)
Additional paid-in capital	11,203	12,557
Retained earnings	36,142	31,700
Accumulated other comprehensive income (loss)	619	(2,448)
Total shareholders' equity	55,331	50,312
Total liabilities and shareholders' equity	$ 55,643	$ 50,609

(1) Chubb maintains two notional multicurrency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information.
The condensed financial information should be read in conjunction with the consolidated financial statements and notes thereto.

SCHEDULE II (continued)
Chubb Limited and Subsidiaries

CONDENSED FINANCIAL INFORMATION OF REGISTRANT

STATEMENTS OF OPERATIONS (Parent Company Only)

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Revenues			
Investment income [(1)]	**$ 227**	$ 305	$ 336
Equity in net income of subsidiaries and affiliates	**4,307**	3,753	3,640
	4,534	4,058	3,976
Expenses			
Administrative and other (income) expense	**65**	63	63
Chubb integration expenses	**1**	14	32
Income tax expense	**14**	19	20
	80	96	115
Net income	**$ 4,454**	$ 3,962	$ 3,861
Comprehensive income	**$ 7,521**	$ 1,242	$ 4,718

(1) Includes net investment income, interest income, and net realized gains (losses).
The condensed financial information should be read in conjunction with the consolidated financial statements and notes thereto.

STATEMENTS OF CASH FLOWS (Parent Company Only)

	Year Ended December 31		
(in millions of U.S. dollars)	**2019**	2018	2017
Net cash flows from operating activities [(1)]	**$ 412**	$ 256	$ 781
Cash flows from investing activities			
Capital contribution	**(1,000)**	(1,475)	—
Net cash flows used for investing activities	**(1,000)**	(1,475)	—
Cash flows from financing activities			
Dividends paid on Common Shares	**(1,354)**	(1,337)	(1,308)
Common Shares repurchased	**(327)**	—	—
Advances from affiliates	**2,301**	2,519	892
Net proceeds from (payments to) affiliated notional cash pooling programs [(2)]	**(35)**	35	(363)
Net cash flows from (used for) financing activities	**585**	1,217	(779)
Effect of foreign currency rate changes on cash and restricted cash	**4**	—	—
Net increase (decrease) in cash and restricted cash	**1**	(2)	2
Cash and restricted cash – beginning of year	**1**	3	1
Cash and restricted cash – end of year	**$ 2**	$ 1	$ 3

(1) Includes cash dividends received from subsidiaries of $200 million, $75 million, and $450 million in 2019, 2018, and 2017, respectively.
(2) Chubb maintains two notional multicurrency cash pools (Pools) with a third-party bank. Refer to Note 1 f) for additional information.
The condensed financial information should be read in conjunction with the consolidated financial statements and notes thereto.

SCHEDULE IV

Chubb Limited and Subsidiaries

SUPPLEMENTAL INFORMATION CONCERNING REINSURANCE

Premiums Earned

For the years ended December 31, 2019, 2018, and 2017 (in millions of U.S. dollars, except for percentages)	Direct Amount	Ceded To Other Companies	Assumed From Other Companies	Net Amount	Percentage of Amount Assumed to Net
2019					
Property and Casualty	**$ 30,339**	**$ 7,236**	**$ 2,797**	**$ 25,900**	**11%**
Accident and Health	**4,546**	**376**	**119**	**4,289**	**3%**
Life	**991**	**81**	**191**	**1,101**	**17%**
Total	**$ 35,876**	**$ 7,693**	**$ 3,107**	**$ 31,290**	**10%**
2018					
Property and Casualty	$ 28,793	$ 6,792	$ 2,812	$ 24,813	11%
Accident and Health	4,409	342	162	4,229	4%
Life	906	85	201	1,022	20%
Total	$ 34,108	$ 7,219	$ 3,175	$ 30,064	11%
2017					
Property and Casualty	$ 27,774	$ 6,650	$ 2,891	$ 24,015	12%
Accident and Health	4,167	349	221	4,039	5%
Life	841	81	220	980	22%
Total	$ 32,782	$ 7,080	$ 3,332	$ 29,034	11%

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SCHEDULE VI

Chubb Limited and Subsidiaries

SUPPLEMENTARY INFORMATION CONCERNING PROPERTY AND CASUALTY OPERATIONS

As of and for the years ended December 31, 2019, 2018, and 2017 (in millions of U.S. dollars)

	Deferred Policy Acquisition Costs	Net Reserves for Unpaid Losses and Loss Expenses	Unearned Premiums	Net Premiums Earned	Net Investment Income	Net Losses and Loss Expenses Incurred Related to		Amortization of Deferred Policy Acquisition Costs	Net Paid Losses and Loss Expenses	Net Premiums Written
						Current Year	Prior Year			
2019	**$ 4,161**	**$ 48,509**	**$ 16,771**	**$ 30,189**	**$ 3,141**	**$ 19,575**	**$ (845)**	**$ 5,831**	**$ 18,473**	**$ 31,126**
2018	$ 3,926	$ 48,271	$ 15,532	$ 29,042	$ 3,047	$ 19,048	$ (981)	$ 5,630	$ 18,340	$ 29,505
2017	$ 3,805	$ 49,165	$ 15,216	$ 28,054	$ 2,890	$ 19,391	$ (937)	$ 5,519	$ 17,448	$ 28,225