

Risk review

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Risk review

Message from our Group Chief Risk Officer

Managing transition successfully by embracing change

Connecting business strategy to risk taking

Rejoining Zurich as the Group Chief Risk Officer on October 1, 2019, I have inherited a sound risk management organization, evidenced by our strong Standard and Poor's rating for enterprise risk management.

Risk management supports our business actively to enable Zurich to take risks in an informed and disciplined manner, within a predetermined risk appetite and tolerance, and provides the business with constructive challenges to manage risks.

Our integrated risk management framework supports the achievement of the Group's strategy by upholding an effective risk-based control environment

“We are experts in identifying and responding to emerging and current risks that impact our customers, societies and business.”

Peter Giger
Group Chief Risk Officer



Message from our Group Chief Risk Officer

and helps protect capital, liquidity, earnings, and reputation.

By effectively managing our risks, we maintain our resilience and make sure we are there when our customers need us. Zurich's risk review describes our major risks and how we manage them.

Sustainability with a focus on climate change

The Group's commitment to sustainability, including managing the risks posed by climate change, continues to be an integral part of Zurich's risk management approach. The Group promotes best practices by managing the interconnectivity of environmental, social and governance (ESG) risks by engaging with its customers and investees.

Climate change is the most complex risk facing our society today: it is intergenerational, international, and interdependent. Zurich's approach to managing climate risk is rooted in our multi-disciplinary Group-wide risk management process. As the insurance

industry is going through a transformation, a key focus area for Zurich is the transition risks which require far-reaching economic, technological and social structural changes.

Our well-established Total Risk Profiling™ methodology supports us in delivering oversight, risk insights and enhances Zurich's capabilities in managing risks.

In determining the Group's exposure to risks resulting from digital transformation, the Group assesses risks in cyber, information technology, data security and risks arising from emerging technologies and innovation to ensure our business remains resilient in the future.

Financial strength supports the Group's new strategic cycle

Rewarding shareholders through our attractive dividend policy based on sustainable earnings growth, a strong capital base and cash generation is part of our customer-centered strategy.

We use sensitivity and scenario analyses to assess the potential impact of conditions under stress. The Group identifies plausible threat scenarios and quantifies their potential impact on our businesses and financial metrics. Depending on the outcome, we develop, implement and monitor appropriate actions.

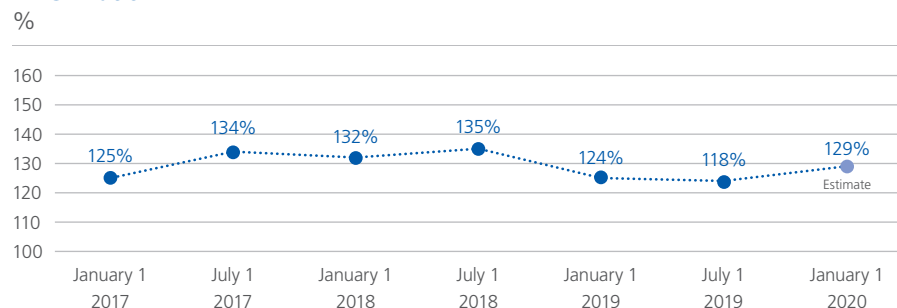
In this report, we present the Zurich Economic Capital Model (Z-ECM) results as well as sensitivity analysis to adverse scenarios. Zurich's very strong Z-ECM capital position and cash remittances support the resilience of the Group's dividend strategy to external events.

Peter Giger
Group Chief Risk Officer

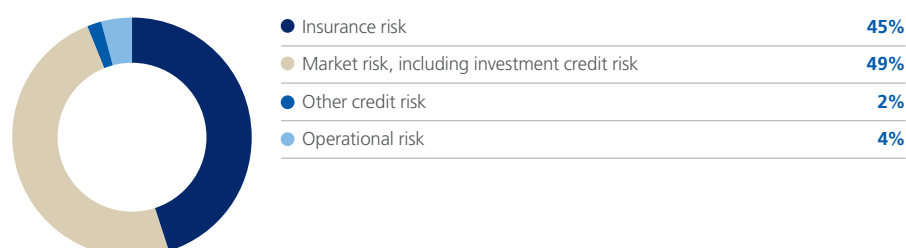
Economic risk profile

The Group's Z-ECM ratio decreased from 124 percent as of January 1, 2019 to 118 percent as of July 1, 2019. The January 1, 2020 estimate is 129 percent with an error margin of +/-5 percentage points. The development of the Z-ECM ratio in 2019 was driven mainly by continued economic profit generation, net of dividend accrual, which was partially offset by an increase in market risk due to the low interest rate environment.

Z-ECM ratio



Total Z-ECM capital required: USD 34.4 billion
%, as of July 1, 2019



Highlights by risk type

Insurance risk

The Group's insurance risk is diversified by geography, line of business, product and customer, supported by our centralized purchase of reinsurance. With the falling interest rate environment, Life has replaced P&C as our largest business segment for Z-ECM capital.

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Market risk

The Group's market risk portfolio remained well diversified across risk drivers and geographies in 2019. Interest-rate risk has increased, driven by falling interest rates, mainly in our German Life business.

[More on page 145](#)

Other credit risk

With proactive governance, the Group's credit risk exposure from reinsurance assets remains at a high quality.

[More on page 152](#)

Operational risk

Our frameworks support the identification, assessment, management, monitoring and reporting of operational risk within the Group.

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Risk review (continued)

Audited

This 'audited' symbol indicates that the information contained within the shaded panel is audited and forms an integral part of the consolidated financial statements.

Audited

Risk management

Objectives of risk management

Taking and managing risk is an integral part of the insurance business. Zurich manages and takes risks in an informed and disciplined manner and within a pre-determined risk appetite and tolerance.

The major risk management objectives at Zurich Insurance Group (Zurich, or the Group) are to:

- ▶ Support achievement of the Group strategy and protect capital, liquidity, earnings and reputation by monitoring that risks are taken within the Group's risk tolerance
- ▶ Enhance value creation by embedding disciplined risk-taking in the company culture and contribute to an optimal risk-return profile where risk reward trade-offs are transparent, understood, and risks are appropriately rewarded
- ▶ Efficiently and effectively diversify risk and avoid or mitigate unrewarded risks
- ▶ Encourage openness and transparency to enable effective risk management
- ▶ Support decision-making processes by providing consistent, reliable and timely risk information
- ▶ Protect Zurich's reputation and brand by promoting a sound culture of risk awareness, and disciplined and informed risk taking

Risk management framework

The risk management framework is based on a governance process that sets forth clear responsibilities for taking, managing, monitoring and reporting risks.

The Zurich Risk Policy is the Group's main risk governance document. It sets standards for effective risk management throughout the Group. The policy describes the Group's risk management framework, provides a standardized set of risk types, and defines the Group's appetite for risks at Group level. Risk-specific policy manuals provide guidelines and procedures to implement the principles in the Zurich Risk Policy. Ongoing assessments verify that requirements are met.

The Group regularly reports on its risk profile at local and Group levels. The Group has procedures to refer risk topics to senior management and the Board of Directors in a timely way. To foster transparency about risk, the Board receives quarterly risk reports and risk updates. In 2019, reporting was supplemented with in-depth risk insights into topics such as information security management, accumulation risk, long-tail Life risk, credit risk and country risk.

The Group identifies, assesses, manages, monitors and reports risks that have an impact on the achievement of its strategic objectives by applying its proprietary Total Risk Profiling™ (TRP) methodology. The methodology allows Zurich to assess risks in terms of severity and probability and supports the definition and implementation of mitigating actions. At Group level, this is an annual process, followed by regular reviews and updates by management.

Risk review (continued)

Audited

The Group's risk appetite and tolerance reflects Zurich's willingness and capacity to take risks in pursuit of value, and sets boundaries within which the businesses act. By monitoring that risks are taken within agreed risk appetite levels and tolerance limits, Zurich protects its capital, liquidity, earnings and reputation. The Group regularly assesses and, as far as possible, quantifies material risks to which it is exposed.

Zurich's goal is to maintain capital consistent with a 'AA' financial strength rating for the Group. The Group translates that goal into a quantified risk tolerance. The primary metric used to steer business is the Zurich Economic Capital Model (Z-ECM) which provides a key input into the Group's planning process as an assessment of the Group's risk profile against the Group's risk tolerance. The Z-ECM forms the basis for optimizing the Group's risk-return profile by providing consistent risk measurement across the Group.

Group's Z-ECM overall risk appetite and tolerance

<90%

Z-ECM ratio below Group risk tolerance level, requiring appropriate remedial actions

90–100%

Position may be tolerated for a certain length of time depending on the risk environment

100–120%

'AA' target range
No action required as within stated objective and equivalent to 'AA' rating

120–140%

Consider increased risk-taking or remedial actions

>140%

Z-ECM ratio indicating over-capitalization, requiring implementation of mitigating actions

Z-ECM ratio

Risk-based remuneration

Based on the Group's remuneration rules, the Board of Directors designs and structures remuneration arrangements that support the achievement of strategic and financial objectives and do not encourage inappropriate risk-taking. Group Risk Management's role in respect to remuneration and its interaction with Board committees is described in the remuneration report.

Risk review (continued)

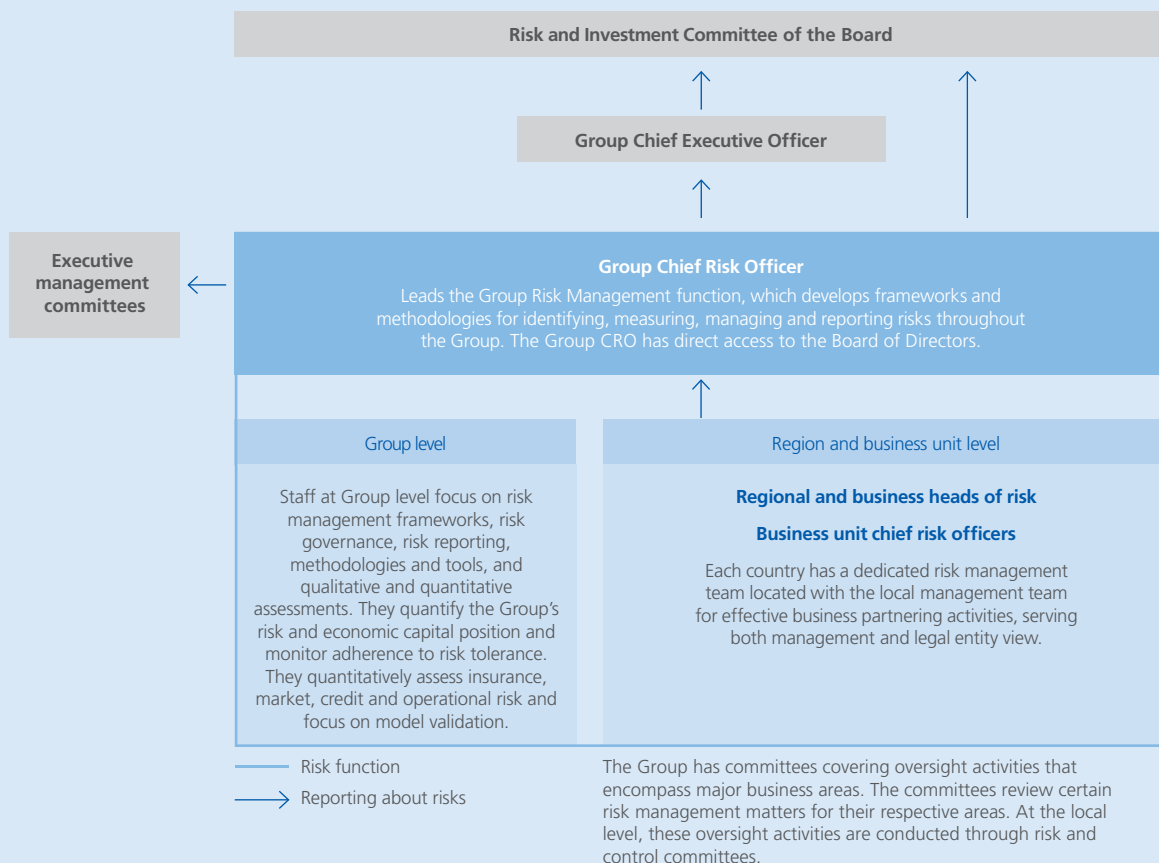
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Risk governance and risk management organization

For information on the Group's overall governance, including the Board of Directors and Group executive level, see the 'corporate governance report (unaudited).'

Risk management organization

The Group Risk Management function is a global function, led by the Group CRO.



The risk function is independent of the business by being a vertically integrated function where global risk employees report directly into the Group CRO, except for Farmers' Chief Risk Officer, who has a matrix reporting line to the Group CRO, or unless otherwise required by local laws or regulations. Risk officers are embedded in the business, positioning them to support and advise, and independently challenge, business decisions from a risk perspective. As business advisers on risk matters, the risk officers, equipped with technical risk skills as well as business skills, help foster a risk-aware culture in the business.

Risk review (continued)

Audited

Capital management

Objectives of capital management

The Group manages capital to maximize long-term shareholder value while maintaining financial strength within its 'AA' target range, and meeting regulatory, solvency and rating agency requirements.

As of December 31, 2019, shareholders' equity of USD 35.0 billion, subordinated debt of USD 6.9 billion and senior financial debt of USD 3.2 billion, excluding net new issued senior debt since the second quarter of 2018, were part of the capital available in the Group's economic framework. Further adjustments usually include items such as intangible assets, deferred tax assets and liabilities, allowing for discounting of liabilities and the value of in-force business, or inclusion of market value margin and expected profit over the next 12 months. For more information, see analysis of the 'Group's Z-ECM available financial resources' (unaudited).

Zurich strives to simplify the Group's legal entity structure to reduce complexity and increase fungibility of capital.

Capital management framework

The Group's capital management framework forms the basis for actively managing capital within Zurich. The Group uses a number of different capital models, taking into account economic, regulatory, and rating agency constraints. The Group's capital and solvency position is monitored and regularly reported to the Executive Committee (ExCo).

Zurich's policy is to allocate capital to businesses earning the highest risk-adjusted returns, and to pool risks and capital as much as possible to operationalize its risk diversification.

The Group's executive management determines the capital management strategy and sets the principles, standards and policies to execute the strategy. Group Treasury and Capital Management executes the strategy.

Capital management program

The Group's capital management program comprises various actions to optimize shareholders' total return and to meet capital needs, while enabling Zurich to take advantage of growth opportunities. Such actions include paying and receiving dividends, capital repayments, share buy-backs, issuance of shares, issuance of senior and hybrid debt, securitization and purchase of reinsurance.

The Group seeks to maintain a balance between higher returns for shareholders on equity held, and the security a sound capital position provides. Dividends, share buy-backs, and issuances and redemption of debt have a significant influence on capital levels. In 2019, the Group paid a dividend out of retained earnings, bought own shares to avoid dilution from share-based employee plans and cancelled shares bought back in 2018 through the public share buy-back program, issued senior debt to finance redemptions and investments in the Group's development, and called hybrid debt that was re-financed during 2019.

The Swiss Code of Obligations stipulates that dividends may only be paid out of freely distributable reserves or retained earnings. Apart from what is specified by the Swiss Code of Obligations, Zurich Insurance Group Ltd faces no legal restrictions on dividends it may pay to its shareholders. As of December 31, 2019, the amount of the statutory general legal reserve was more than 30 times the paid-in share capital. The ability of the Group's subsidiaries to pay dividends may be restricted or indirectly influenced by minimum capital and solvency requirements imposed by insurance and other regulators in the countries in which the subsidiaries operate. Other limitations or considerations include foreign exchange control restrictions in some countries, and rating agencies' methodologies.

For details on issuances and redemptions of debt, see note 18 of the consolidated financial statements.

For details on the share buy-back program, see note 19 of the consolidated financial statements.

Risk review (continued)

Audited

Risk and solvency assessment

Economic capital adequacy

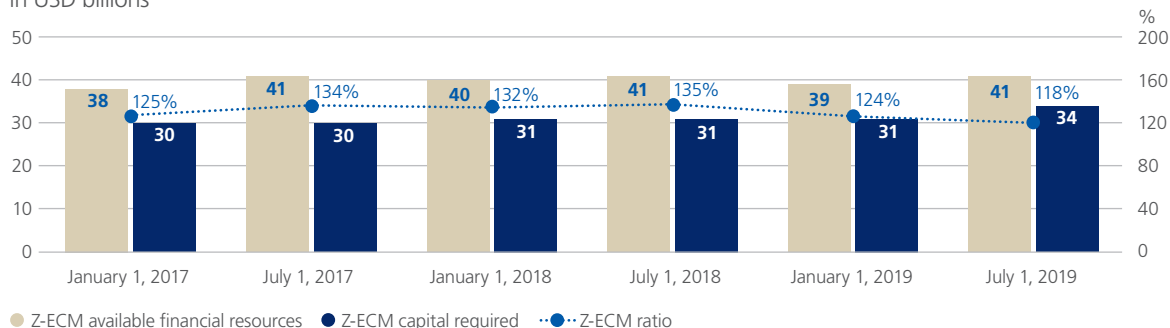
Internally, the Group uses its Zurich Economic Capital Model (Z-ECM) for assessing its economic capital adequacy. Z-ECM targets a total capital level that is calibrated to an 'AA' financial strength. Zurich defines the Z-ECM capital requirement as the capital required to protect the Group's policyholders in order to meet all of their claims with a confidence level of 99.95 percent over a one-year time horizon.

The Group uses Z-ECM to assess the economic capital consumption of its business on a one-balance-sheet approach. Z-ECM is an integral part of how the Group is managed. It is embedded in the Group's organization and decision-making processes, and is used in capital allocation, business performance management, pricing, and communication. Z-ECM quantifies the capital required for insurance-related risk (including premium and reserve, natural catastrophe, business and life insurance risk), market risk including investment credit risk, reinsurance credit risk, other credit risk, and operational risk.

At the Group level, Zurich compares Z-ECM capital required to the Z-ECM available financial resources (AFR) to derive an economic solvency ratio (Z-ECM ratio). Z-ECM AFR reflects financial resources available to cover policyholder liabilities in excess of their expected value. It is derived by adjusting the IFRS shareholders' equity to reflect the full economic capital base available to policyholders to absorb any unexpected volatility in the Group's business activities.

The chart below shows the development of the Group's Z-ECM AFR, Z-ECM capital required and Z-ECM ratio over time. As of January 1, 2020, the Z-ECM ratio was estimated at 129% with an error margin of +/-5 percentage points.

Analysis of the Group's Z-ECM available financial resources and Z-ECM capital required in USD billions

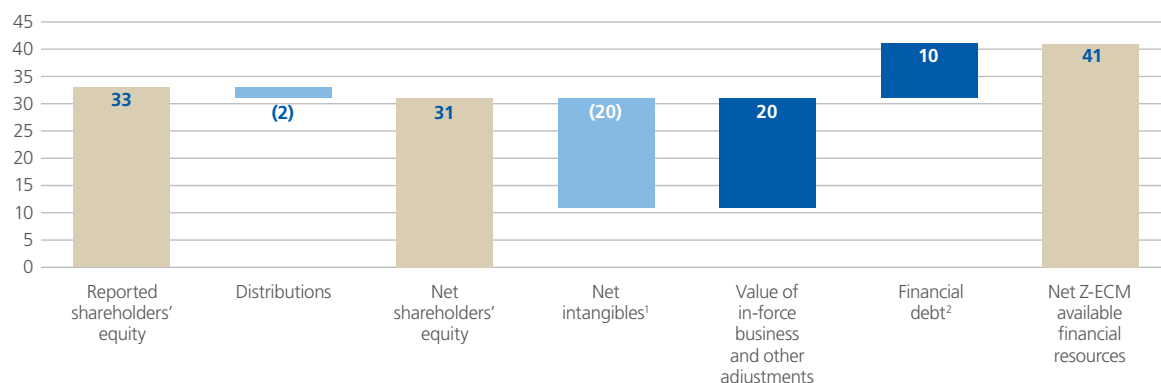


Risk review (continued)

The chart below shows an analysis of the composition of the Group's Z-ECM available financial resources as of July 1, 2019.

Analysis of the Group's Z-ECM available financial resources

in USD billions, as of July 1, 2019



¹ Shareholders' intangible assets including deferred tax assets less deferred front-end fees and deferred tax liabilities

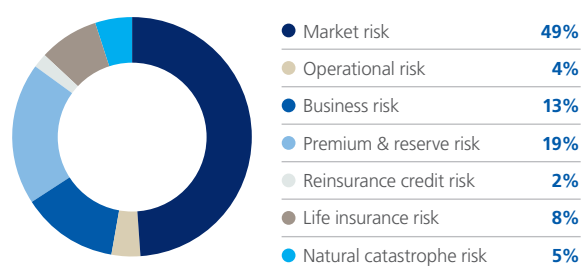
² All debt issues (senior and subordinated) excluding those classified as operational debt whereby, since the second quarter of 2019, excluding net new issued senior debt.

The chart below shows the Z-ECM capital required, split by risk type, as of July 1, 2019 and as of January 1, 2019. As of July 1, 2019, the largest proportion of Z-ECM capital required pertained to market risk which comprised 49 percent of the total. Z-ECM capital required for premium and reserve risk was the second-largest, comprising 19 percent. The increase in Z-ECM required capital between January 1, 2019 and July 1, 2019 is principally due to an increase in market risk and life insurance risk, mainly as a result of a falling interest rate environment.¹ Remaining risk types saw smaller movements between January 1, 2019 and July 1, 2019. However, in relative terms, they contribute less to the Group required capital due to larger market and life insurance risks. The increase in Z-ECM required capital is mainly attributable to the Life business, which as a result replaced Property and Casualty as the largest business segment as of July 1, 2019.

Z-ECM capital required, split by risk type

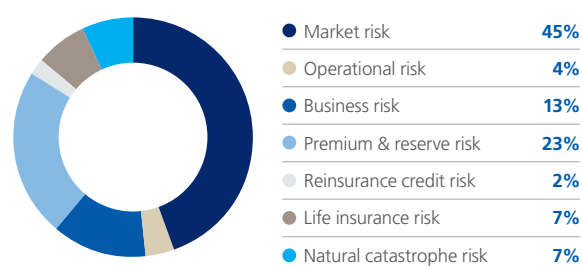
July 1, 2019

Total Z-ECM capital required: USD 34.4 billion



January 1, 2019

Total Z-ECM capital required: USD 31.0 billion



¹ The acquisition of OnePath, see note 5 in the consolidated financial statements, has been recognized as a preliminary estimate in Z-ECM required capital in July 1, 2019, contributing to the increase in life insurance risks and market risk

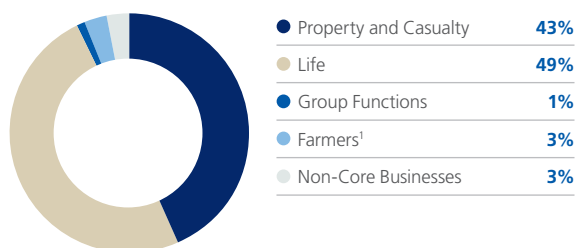
Risk review (continued)

The total allocated capital as of July 1, 2019 equaled USD 34.6 billion. As of July 1, 2019 the largest proportions of Z-ECM capital required were allocated to Life with 49 percent and Property and Casualty with 43 percent of the total. The following chart shows the Z-ECM capital required allocated to the businesses as of July 1, 2019 and January 1, 2019.

Total capital allocated, by business

July 1, 2019

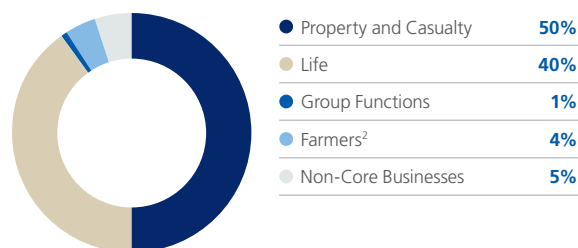
Total capital allocated: USD 34.6 billion¹



¹ Includes direct allocation of USD 0.2 billion to Farmers.

January 1, 2019

Total capital allocated: USD 31.2 billion²



² Includes direct allocation of USD 0.2 billion to Farmers.

Sensitivity and scenario analysis

The Group evaluates sensitivities to, and stress scenarios on, the Z-ECM ratio, and presents results relative to Zurich's risk tolerance and appetite. The sensitivities and stress scenarios in the following chart capture two key risks to the Group: market risk and insurance risk. For insurance risk, the chart shows the three largest natural catastrophe events to which the Group is exposed.

Market risk sensitivities show the estimated impact on the Group's Z-ECM ratio of a one percentage point (100 basis points or bps) increase or decrease in yield curves, a 10 percent appreciation in the U.S. dollar, a 20 percent rise or decline in all stock markets, and a one percentage point change in credit spreads, with and without euro-denominated sovereign bonds. The sensitivities are considered as separate but instantaneous scenarios. They are a best estimate and non-linear, i.e., a change in the scenario input could result in disproportionately higher (or lower) impact on the Z-ECM ratio depending on the prevailing market conditions at the time.

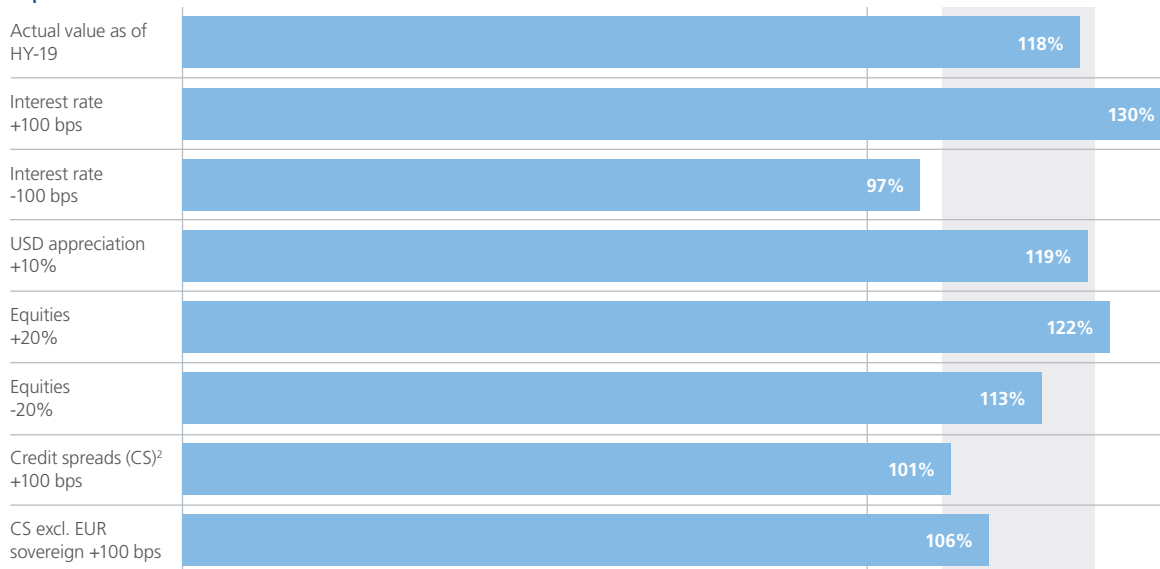
Scenarios are defined as events that have a small probability of occurring but that could, if realized, negatively affect the Group's Z-ECM AFR. The impact of insurance-specific scenarios on the required capital is not taken into account.

Risk review (continued)

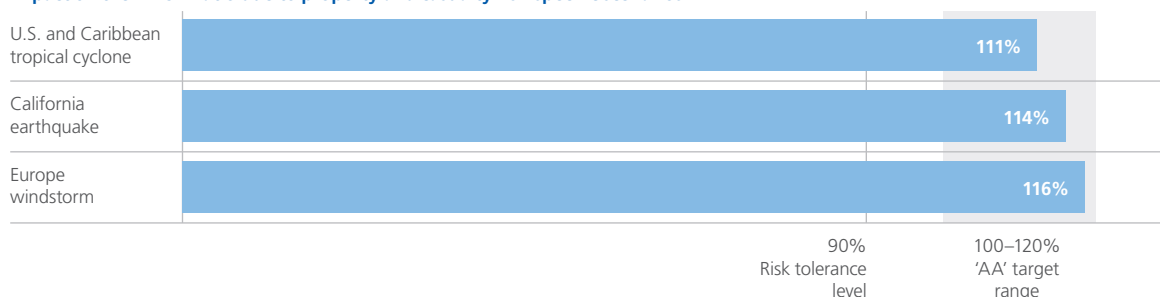
Z-ECM sensitivities and scenarios¹

as of July 1, 2019

Impact on the Z-ECM ratio from sensitivities to financial market conditions:



Impact on the Z-ECM ratio due to property and casualty risk-specific scenarios:³



¹ Z-ECM is calibrated at a 99.95 percentile of value at risk (equivalent to a 'AA' rating).

² Credit spreads (CS) include mortgages, including and excluding euro sovereign spreads. Sensitivity is net of profit sharing with policyholders.

³ The insurance risk-specific scenarios relate to natural catastrophe events that are estimated on a modeled 250-year net aggregate loss (equivalent to a 99.6 percent probability of non-exceedance).

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Insurance financial strength rating

The Group has interactive relationships with three global rating agencies: S&P Global Ratings, Moody's, and AM Best. The insurance financial strength rating (IFSR) of the Group's main operating entity, Zurich Insurance Company Ltd, is an important element of Zurich's competitive position, particularly for the commercial customer segment. The Group's credit ratings derived from the financial strength ratings also affect the cost of capital.

On October 29, 2019, S&P Global Ratings revised to positive from stable the outlook of Zurich Insurance Company Ltd and its core subsidiaries and affirmed the 'AA-' long-term insurer financial strength and issuer credit ratings. This rating action is based on S&P Global Ratings increased confidence "in the strength and resilience of Zurich's profitability and business risk profile, relative to peers, and the sustainability of the Group's very strong capital adequacy."

As of December 31, 2019, the IFSR of Zurich Insurance Company Ltd, the main operating entity of the Group, was 'AA-/Positive' by S&P Global Ratings, 'Aa3/Stable' by Moody's, and 'A+ (Superior)/Stable' by A.M. Best.

Risk review (continued)

Audited

Regulatory capital adequacy

The Group endeavors to manage its capital so that its regulated entities meet local regulatory capital requirements. In each country in which the Group operates, the local regulator specifies the minimum amount and type of capital that each of the regulated entities must hold in addition to their liabilities. In addition to the minimum capital required to comply with the solvency requirements, the Group aims to hold an adequate buffer under local solvency requirements to ensure regulated subsidiaries can absorb volatility and meet local capital requirements.

Regulatory requirements in Switzerland

Under the Swiss Solvency Test (SST), insurance companies and insurance groups can apply to use company-specific internal models to calculate risk-bearing and target capital, as well as the SST ratio. The SST ratio has to be calculated as per January 1 and must be submitted to the Swiss Financial Market Supervisory Authority (FINMA). Zurich filed with FINMA an SST ratio of 221 percent (unaudited) as of January 1, 2019.

In 2019, Zurich continued to enhance its internal model, completed the approval process with FINMA, and received approval for the outstanding modules of its internal model. Accordingly, the Group's SST Internal Model is now fully approved.

Regulatory requirements in other countries

Regulatory requirements in the European Economic Area (EEA)

The main regulatory framework governing the Group's subsidiaries in the EEA is Solvency II. This is a risk-based capital framework which covers capital requirements (pillar 1), governance and risk management (pillar 2) and reporting (pillar 3). All EEA-based legal entities of the Group use the Solvency II standard formula for their pillar 1 requirements with the exception of Zurich Insurance plc (Ireland) that applies an approved internal model.

Regulatory requirements in the UK

The United Kingdom left the EU and the EEA on January 31, 2020. Under the EU Withdrawal Agreement Act, the regulatory requirements are expected to remain consistent with Solvency II until the end of the transition period, December 31, 2020. After that date we currently expect the UK regulatory regime to maintain a high level of ongoing alignment with the Solvency II regulatory requirements.

Regulatory requirements in the U.S.

In the U.S., required capital is determined to be 'company action level risk-based capital' calculated using the National Association of Insurance Commissioners' risk-based capital model. This method, which builds on regulatory accounts, measures the minimum amount of the capital for an insurance company to support its overall business operations by taking into account its size and risk profile.

Regulatory requirements in other jurisdictions

Every country has a capital standard for insurance companies. Several jurisdictions (e.g., Brazil and Mexico) have taken approaches similar to Solvency II.

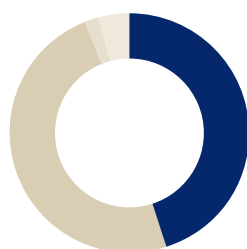
Risk review (continued)

Analysis by risk type

Insurance risk

Section highlights

Total Z-ECM capital required: USD 34.4 billion
%, as of July 1, 2019



Insurance risk	45%
Market risk, including investment credit risk	49%
Other credit risk	2%
Operational risk	4%

Key risk and capital indicators

Z-ECM, in USD billions	July 1, 2019	January 1, 2019
Business risk	4.4	3.9
Life liability risk	2.7	2.1
Premium & reserve risk	6.6	7.1
Natural catastrophe risk	1.9	2.1

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Insurance risk is the inherent uncertainty regarding the occurrence, amount or timing of insurance cash flows. The profitability of insurance business is also susceptible to business risk in the form of unexpected changes in expenses, policyholders' behavior, and fluctuations in new business volumes. Zurich manages insurance risk through:

- ▶ Specific underwriting and claims standards and controls
- ▶ Robust reserving processes
- ▶ External reinsurance

Property and casualty insurance risk

Property and casualty insurance risk arises from coverage provided for motor, property, liability, special lines and worker injury. It comprises premium and reserve risk, catastrophe risk, and business risk. Premium and reserve risk covers uncertainties in the frequency of the occurrence of the insured events as well as in the severity of the resulting claims. Catastrophe risk predominantly relates to uncertainty around natural catastrophes. Business risk for property and casualty predominantly relates to unexpected increases in the expenses relating to claims handling, underwriting, and administration.

Management of Property & Casualty business insurance risk

The Group's underwriting strategy takes advantage of the diversification of Property & Casualty (P&C) risks across lines of business and geographic regions. Zurich's underwriting governance is applicable throughout the Group. Underwriting discipline is a fundamental part of managing insurance risk. The Group sets limits on underwriting capacity and delegates authority to individuals based on their specific expertise, and sets appropriate underwriting and pricing guidelines. Technical reviews assure that underwriters perform within authorities and adhere to underwriting philosophies and policies.

Property & Casualty insurance reserves are regularly estimated, reviewed and monitored by qualified and experienced actuaries at local, regional and Group levels. To arrive at their reserve estimates, the actuaries take into consideration, among other things, the latest available facts, trends and patterns of loss payments. Inflation is monitored with insights feeding into actuarial reserving models and Zurich's underwriting processes and pricing.

To ensure a common understanding of business insights and new trends for reserve analysis, financial plans, underwriting and pricing decisions, the Group has established a culture of continuous cross-functional collaboration. For this, underwriting, actuarial (pricing and reserving), claims, finance, sales and distribution, risk engineering and risk management contribute to quarterly meetings on local and Group level.

Zurich's emerging risk group, with cross-functional expertise from core insurance functions such as underwriting, claims and risk management, identifies, assesses and recommends actions for emerging risks.

Actions continue to rebalance the portfolio, reducing exposure to long tail lines. Governance is in place to ensure appropriate top-line targets and profitability. Reinsurance is deployed to help manage insurance risk. Group Risk Management also provides independent assurance through risk reviews.

Risk review (continued)

Audited

The Group is exposed to losses that could arise from natural and man-made catastrophes. The main concentrations of risks arising from such potential catastrophes are regularly reported to executive management. The most important peril regions and natural catastrophes (Nat Cat) continue to be U.S. and Caribbean windstorm, California earthquake and Europe windstorm.

Natural catastrophes

The Group uses third-party models (adjusted to Zurich's view) to manage its underwriting, ensure accumulations stay within intended exposure limits and assess the capital requirement due to natural catastrophes. The same view Zurich has on natural catastrophe risk also underpins profitability assessment and strategic capacity allocation and guides the type and quantity of reinsurance Zurich buys.

To ensure global consistency, Nat Cat exposures are modeled in a Group function. Potential losses from property policies with material exposure in hazard-prone geographical areas and from worker injury policies with material exposure in U.S. seismic zones are probabilistically modeled. Losses for other lines of business are estimated based on adjustments to these modeled results. Risk modeling mainly addresses climate-induced perils such as windstorm, flood, tornado, and hail, and geologically-induced perils such as earthquake.

Zurich constantly reviews and expands the scope and sophistication of its modeling and strives to improve data quality. Catastrophe research and development is strengthened to increase the focus on the risks from a changing climate. It supplements internal know-how with external knowledge (e.g., the Advisory Council for Catastrophes). Zurich is a shareholder of catastrophe exposure and loss data aggregation and estimation firm PERILS AG, Switzerland and is a member of the open-source initiative Oasis Loss Modeling Framework.

Man-made catastrophes

Man-made catastrophes include events such as industrial accidents, terrorism and cyber attacks.

For terrorism, worker injury and property risk exposures are analyzed to identify areas with significant risk concentration. Other lines of business are assessed, although the potential exposure is not as significant. A vendor-provided catastrophe model is used to evaluate potential exposures in every major U.S. city and selected cities in Europe. The Group's analysis for the P&C business has shown that its exposures outside of North America are lower, in a large part due to government-provided pools. Outside the modeled areas, exposure concentrations are identified in Zurich's Risk Exposure Data Store (REDS). Exposure concentrations for location-based man-made scenarios, other than terrorism, are also identified in REDS, for example, industrial explosions at global ports.

The Group uses third-party models to manage its underwriting and accumulations for cyber and casualty catastrophe. The Group actively monitors and manages its cyber exposure and continue to refine products to ensure their appropriateness. Improving modeling capabilities and data capture for cyber and casualty catastrophe risks are key focus areas.

Concentration of Property & Casualty business insurance risk

The Group defines concentration risk in the Property & Casualty (P&C) business as the risk of exposure to increased losses associated with inadequately diversified portfolios. Concentration risk for a property and casualty insurer may arise due to a concentration of business written within a geographical area or of underlying risks covered.

Tables 1.a and 1.b show the Group's concentration of risk within the P&C business by region and line of business based on direct written premiums before reinsurance. P&C premiums ceded to reinsurers (including retrocessions) amounted to USD 7.8 billion and USD 7.0 billion for the years ended December 31, 2019 and 2018, respectively. Reinsurance programs are managed on a global basis, and therefore, the net premium after reinsurance is monitored on an aggregated basis.

Risk review (continued)

Audited

Table 1.a

Property & Casualty business – Direct written premiums and policy fees by line of business – current period	in USD millions, for the year ended December 31, 2019			Special	Worker		
		Motor	Property	Liability	lines	injury	Total
	Europe, Middle East & Africa	4,050	4,328	2,005	2,009	329	12,722
	North America	1,499	5,126	2,719	2,361	2,684	14,389
	Other regions	1,673	1,573	386	1,865	144	5,641
	Total	7,222	11,027	5,110	6,236	3,158	32,752

Table 1.b

Property & Casualty business – Direct written premiums and policy fees by line of business – prior period	in USD millions, for the year ended December 31, 2018				Special lines	Worker injury	Total
	Motor	Property	Liability				
	Europe, Middle East & Africa	4,546	4,118	1,962	1,986	343	12,955
	North America	1,422	4,622	2,638	2,494	2,735	13,912
	Other regions	1,595	1,402	356	1,769	150	5,272
	Total	7,563	10,142	4,957	6,249	3,228	32,139

Analysis of sensitivities for Property & Casualty business risks

Tables 2.a and 2.b show the sensitivity of net income before tax and the sensitivity of net assets, using the Group effective income tax rate, as a result of adverse development in the net loss ratio by one percentage point. The sensitivities do not indicate a probability of such an event and do not consider any non-linear effects of reinsurance. Based on the assumptions applied in the sensitivity analysis in tables 2.a and 2.b, each additional percentage point increase in the loss ratio would have a linear impact on net income before tax and net assets. The Group also monitors insurance risk by evaluating extreme scenarios, taking into account the non-linear effects of reinsurance contracts.

Table 2.a

Insurance risk sensitivity for the Property & Casualty business – current period	in USD millions, for the year ended December 31, 2019	Europe, Middle East & Africa	North America	Asia Pacific	Latin America	Reinsurance	Total
	+1% in net loss ratio						
	Net income before tax	(115)	(96)	(24)	(22)	–	(256)
	Net assets	(88)	(73)	(19)	(16)	–	(196)

Table 2.b

Insurance risk sensitivity for the Property & Casualty business – prior period	in USD millions, for the year ended December 31, 2018	Europe, Middle East & Africa	North America	Asia Pacific	Latin America	Reinsurance	Total
	+1% in net loss ratio						
	Net income before tax	(121)	(100)	(23)	(21)	1	(264)
	Net assets	(91)	(75)	(17)	(16)	—	(199)

Risk review (continued)

Audited

Life insurance risk

The risks associated with life insurance include:

Life liability risk

- ▶ Mortality risk – when on average, the death incidence among the policyholders is higher than expected
- ▶ Longevity risk – when on average, annuitants live longer than expected
- ▶ Morbidity risk – when on average, the incidence of sickness or disability among the policyholders is higher or recovery rates from disability are lower than expected

Life business risk

- ▶ Policyholder behavior risk – on average, the policyholders discontinue or reduce contributions or withdraw benefits prior to the maturity of contracts at a rate that is different from expected
- ▶ Expense risk – expenses incurred in acquiring and administering policies are higher than expected
- ▶ New business risk – volumes of new business are insufficient to cover fixed acquisition expenses

Market risk

- ▶ Market risk – the risk associated with the Group's balance sheet positions where the value or cash flow depends on financial markets, which is analyzed in the 'market risk, including investment credit risk' section

Credit risk

- ▶ Credit risk – the risk associated with a loss or potential loss from counterparties failing to fulfill their financial obligations, which is analyzed in the 'market risk, including investment credit risk' and 'other credit risk' sections

A more diversified portfolio of risks is less likely than an undiversified portfolio to be affected across the board by a change in any subset of the risks. Diversification across regions and businesses (between unit-linked and other business including protection and life annuity products, as shown in Table 3 below) contributes to reducing the impacts of the risks associated with the Life business listed above.

Management of Life business insurance risk

The Group has local product development committees and a Group-level committee to analyze potential new life products that could significantly increase or change the nature of its risks. The Group regularly reviews the continued suitability and the potential risks of existing life products to ensure sustainability of the business.

Unit-linked products are designed to reduce much of the market and credit risk associated with the Group's traditional business. Risks that are inherent in these products are largely passed on to the policyholder, although a portion of the Group's management fees is linked to the value of funds under management, and hence is at risk if fund values decrease. To the extent that there are guarantees built into the product design, unit-linked products carry mortality/morbidity risk and market risk. Contracts may have minimum guaranteed death benefits where the sum at risk depends on the fair value of the underlying investments. For certain contracts, these risks are mitigated by mortality and morbidity charges.

Other life insurance liabilities include traditional life insurance products, such as protection and life annuity products. Protection products carry mortality, longevity and morbidity risk, as well as market and credit risk. Changes in medical treatments and lifestyle changes are among the most significant factors that could result in earlier or more claims than expected. Disability, defined in terms of the ability to perform an occupation, could be affected by adverse economic conditions. To reduce pricing cross-subsidies, where permitted, premiums are adjusted for factors such as age, gender and smoker status. Policy terms and conditions and disclosure requirements in insurance applications are designed to mitigate the risk arising from non-standard and unpredictable risks that could result in severe financial loss. In the life annuity business, medical advances and improved social conditions that lead to increased longevity are the most significant insurance risk. Annuitant (beneficiary) mortality assumptions include allowance for future mortality improvements.

Risk review (continued)

Audited

The Group is also exposed to risks posed by policyholder behavior and fluctuating expenses. Policyholder behavior risk is mitigated by designing products that, as closely as possible, match revenue and expenses associated with the contract. Expense risk is reduced by carefully controlling expenses, and through regular expense analysis and allocation exercises to ensure responsible and sustainable business practices.

The Group is also exposed to investment and surrender risks related to bank-owned life insurance contracts sold in the U.S. These risks have reduced significantly in recent years as several have switched into less risky investment divisions. See heading 'other contracts' in note 7 of the consolidated financial statements for additional information.

Lower interest rates have led to an increase in both Life business risks and Life liability risks (especially Longevity risk).

Furthermore, interest rate guarantees (with concentration in traditional, guaranteed business in Germany and Switzerland and variable annuity business in the U.S. containing minimum guaranteed death benefits) expose Zurich to financial losses that may arise as a result of adverse movements in interest rates. These guarantees are managed through a combination of asset-liability management and hedging.

The Group has a dynamic hedging strategy to reduce the investment risk associated with the closed book of variable annuities written by its U.S. subsidiary Zurich American Life Insurance Company. This exposure has fallen substantially as a result of several policy buy-back programs since 2015.

Concentration of Life business insurance risk

The Group defines concentration risk in the life business as the risk of exposure to increased losses associated with inadequately diversified portfolios of assets or obligations. Concentration risk for a life insurer may arise with respect to investments in a geographical area, economic sector, or individual issuers, or due to a concentration of business written within a geographical area, of a policy type, or of underlying risks covered.

Observing best-estimate assumptions on cash flows related to benefits of insurance contracts gives some indication of the size of the exposure to risks and the extent of risk concentration. Table 3 shows the Group's concentration of risk within Life by region and line of business based on reserves for life insurance on a net of reinsurance basis. The life insurance reserves also include policyholder surplus reserves with a loss absorbing capacity¹, predominantly in Germany for an amount of USD 9.4 billion in 2019 (2018: USD 7.4 billion) and in the UK for an amount of USD 0.5 billion in 2019 (2018: USD 0.5 billion). The Group's exposure to life insurance risks varies significantly by geographic region and line of business and may change over time. See note 8 of the consolidated financial statements for additional information on reserves for insurance contracts.

¹ Policyholder surplus reserves with loss-absorbing capacity refer to funds allocated to the policyholders that can be used by the shareholders, which, under certain conditions, may require regulatory approval.

Table 3

in USD millions, as of December 31

Reserves, net of reinsurance, by region

	Unit-linked insurance contracts		Other life insurance liabilities		Total reserves	
	2019	2018	2019	2018	2019	2018
Life						
Europe, Middle East & Africa	46,919	41,229	81,372	77,756	128,291	118,985
of which:						
United Kingdom	16,371	15,323	3,786	3,271	20,157	18,594
Germany	19,001	15,976	38,511	36,980	57,512	52,956
Switzerland	776	634	17,456	17,294	18,232	17,928
Italy	2,709	1,568	5,348	4,521	8,057	6,089
Ireland	1,885	2,347	2,235	2,021	4,121	4,368
Spain	655	699	11,773	11,415	12,428	12,114
Zurich International	5,129	4,339	220	309	5,349	4,648
Rest of Europe, Middle East & Africa	392	342	2,043	1,946	2,435	2,288
North America	10,253	9,241	1,035	893	11,288	10,135
Asia Pacific	598	539	4,311	2,791	4,908	3,330
Latin America	15,093	13,159	5,826	5,385	20,919	18,544
Group Reinsurance	–	–	5	2	5	2
Eliminations	–	–	(12)	(13)	(12)	(13)
Subtotal	72,863	64,168	92,537	86,814	165,399	150,982
Other businesses	4,821	4,598	9,940	9,474	14,761	14,072
Total	77,684	68,766	102,477	96,288	180,160	165,054

Risk review (continued)

Audited

Analysis of sensitivities for Life business insurance risk

The Group uses market-consistent embedded value reporting principles, which allow Zurich to increase its understanding of, and report on, the risk profile of its life products, and how these risks would change under different market conditions. Embedded value is a measure that markets use to value life businesses. For more information, see the 'embedded value report 2019' (unaudited but subject to assurance review) at www.zurich.com/investor-relations/results-and-reports.

Reinsurance for Property & Casualty and Life businesses

The Group's objective in purchasing reinsurance is to provide market-leading capacity for customers while protecting the balance sheet, supporting earnings volatility management, and achieving capital efficiency. The Group follows a centralized reinsurance purchasing strategy for both Property & Casualty (P&C) and Life, and bundles programs, where appropriate, to benefit from diversification and economies of scale. In support of the Group's empowerment-based management model and to align risk-bearing capacities between the Group and individual country operations, the internal reinsurance vehicle applies to all externally reinsured lines of business. In addition, to actively manage and reduce potential claims-recovery risks on facultative cessions and to support the strategy on operational excellence, the Group started to tailor specific facultative property and casualty reinsurance facilities.

The Group structures and aligns its external reinsurance protection to its capital position to achieve an optimum risk-return ratio. This includes participation in the underlying risks through self-retentions. The Group manages its central reinsurance purchasing according to these principles. The cession rate for P&C was 23.0 percent as of December 31, 2019 and 21.0 percent as of December 31, 2018. The cession rate for Life was 8.0 percent as of December 31, 2019 and 7.0 percent as of December 31, 2018.

The Group uses traditional and collateralized reinsurance markets to protect itself against extreme single events, multiple event occurrences across regions, or increased frequency of events. Specifically, to protect the Group against man-made and natural catastrophe scenarios, per event Zurich arranges an annual aggregate global cover as illustrated on the graph on the next page.

The Group participates in the underlying risks through its retention and through its co-participation in excess layers. The natural catastrophe reinsurance covers are on a loss-occurrence basis except the global aggregate catastrophe cover, which operates on an annual aggregate basis. The in-force natural catastrophe covers renew annually, with the exception of the global catastrophe cover, which renewed on January 1, 2019, for a three-year term.

In addition to these covers, the Group purchases several regional catastrophe covers, entertains a bilateral risk swap, and various line of business-specific risk treaties. These covers are reviewed continuously and are subject to change going forward.

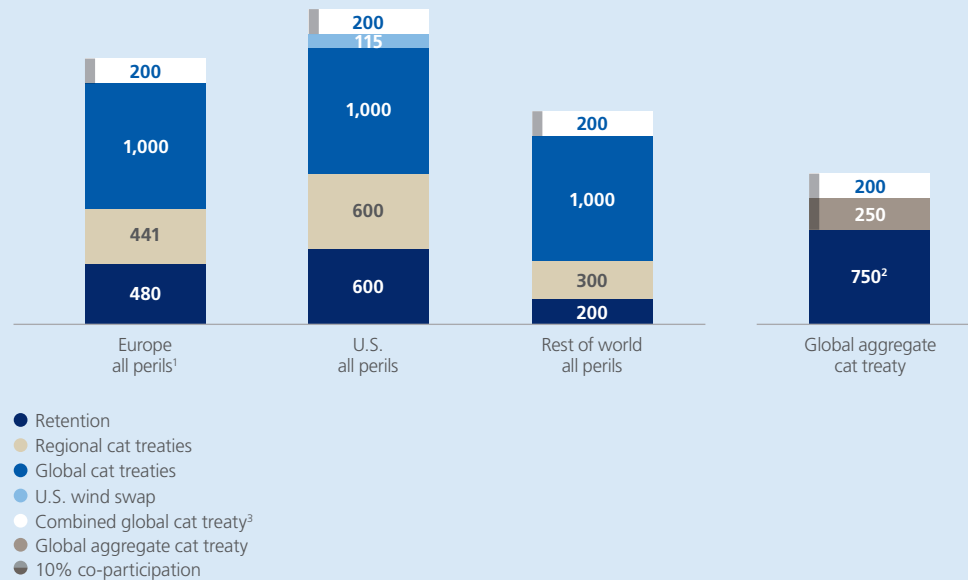
Changes in 2019 include the expansion of the Group's global catastrophe treaty limit to USD 1 billion (up from USD 750 million) and the transition from several regional surety treaties to one single global surety treaty to enhance coverage and generate efficiency.

To complement existing treaties, the Group purchases catastrophe reinsurance specific to life insurance for its exposure to natural and man-made catastrophes.

Risk review (continued)

Audited

2019 Group catastrophe reinsurance protection in USD millions, as of December 31, 2019



¹ Europe cat treaty calculated with EUR/USD exchange rate as of July 31, 2019.

² Franchise deductible of USD 25 million, i.e. losses greater than USD 25 million count toward the erosion of the retention (annual aggregate deductible).

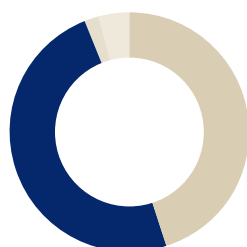
³ This USD 200 million cover can be used only once, either for aggregated losses or for an individual occurrence or event. The attachment point for a U.S. Hurricane event is USD 2,315 million; for any other event USD 2,200 million.

Risk review (continued)

Market risk, including investment credit risk

Section highlights

Total Z-ECM capital required: USD 34.4 billion
%, as of July 1, 2019



Insurance risk	45%
Market risk, including investment credit risk	49%
Other credit risk	2%
Operational risk	4%

Key risk and capital indicators

Z-ECM, in USD billions	July 1, 2019	January 1, 2019
Market risk, including investment credit risk	16.9	13.9

Audited

Market risk is the risk associated with the Group's balance sheet positions where the value or cash flow depends on financial markets. Risk factors include:

- ▶ Equity market prices
- ▶ Real estate market prices
- ▶ Interest-rate risk
- ▶ Credit and swap spread changes
- ▶ Defaults of issuers
- ▶ Currency exchange rates

The Group manages the market risk of assets relative to liabilities on an economic total balance sheet basis. This is done to achieve the maximum risk-adjusted excess return on assets relative to the liability benchmark, while taking into account the Group's risk appetite and tolerance and local regulatory constraints.

The Group has policies and limits to manage market risk and keep its strategic asset allocation in line with its risk capacity. Zurich centrally manages certain asset classes to control aggregation of risk and provides a consistent approach to constructing portfolios and selecting external asset managers. It diversifies portfolios, investments and asset managers, and regularly measures and manages market risk exposure. The Group has set limits on concentration in investments in single issuers and certain asset classes, as well as by how much asset interest rate sensitivities can deviate from liability interest-rate sensitivities. The Group regularly reviews its capacity to hold illiquid investments.

The Asset/Liability Management Investment Committee reviews and monitors Group strategic asset allocation and tactical boundaries, and monitors Group asset/liability exposure. The Group oversees the activities of local asset/liability management investment committees and regularly assesses market risks at both Group and local business levels. The economic effect of potential extreme market moves is regularly examined and considered when setting the asset allocation.

Risk assessment reviews include the analysis of the management of interest-rate risk for each major maturity bucket and adherence to the aggregate positions with risk limits. The Group applies processes to manage market risks and to analyze market risk hotspots. Actions to mitigate risk are taken if necessary to manage fluctuations affecting asset/liability mismatch and risk-based capital.

Risk review (continued)

Audited

The Group may use derivative financial instruments to mitigate market risks arising from changes in currency exchange rates, interest rates and equity prices, from credit quality of assets, and from commitments to third parties. The Group enters into derivative financial instruments mostly for economic hedging purposes and, in limited circumstances, the instruments may also meet the definition of an effective hedge for accounting purposes.

In compliance with Swiss insurance regulation, the Group's policy prohibits speculative trading in derivatives, meaning a pattern of so called in and out activity without reference to an underlying position. The Group addresses the risks arising from derivatives through a stringent policy that requires approval of a derivative program before transactions are initiated, and by subsequent regular monitoring by Group Risk Management of open positions and annual reviews of derivative programs.

For more information on the Group's investment result, including impairments and the treatment of selected financial instruments, see note 6 of the consolidated financial statements. For more information on derivative financial instruments and hedge accounting, see note 7 of the consolidated financial statements.

Risk from equity securities and real estate

The Group is exposed to risks from price fluctuations on equity securities and real estate. These could affect the Group's liquidity, reported income, economic surplus and regulatory capital position. Equity risk exposure includes common stocks, including equity unit trusts, private equity, common stock portfolios backing participating-with-profit policyholder contracts, and equities held for employee benefit plans. Exposure to real estate risk includes direct holdings in property and property company shares and funds. Returns on unit-linked contracts, whether classified as insurance or investment contracts, may be exposed to risks from equity and real estate, but these risks are borne by policyholders. However, the Group is indirectly exposed to market movements from unit-linked contracts with respect to both earnings and economic capital. Market movements affect the amount of fee income earned when the fee income level is dependent on the valuation of the asset base. Therefore, the value of in-force business for unit-linked business can be negatively affected by adverse movements in equity and real estate markets.

The Group manages its risks related to equity securities and real estate as part of the overall investment risk management process, and applies limits as expressed in policies and guidelines. Specifically, Zurich limits holdings in equities, real estate and alternative investments. To realize an optimal level of risk diversification, the strategy for equities is defined through a composite of market benchmark indices. The Group has the capability and processes in place to change the exposure to key equity markets through the use of derivatives or purchase or sale of securities within a short time frame.

For additional information on equity securities and investment property, see note 6 of the consolidated financial statements.

Risk from interest rates and credit spreads

Interest-rate risk is the risk of an adverse economic impact resulting from changes in interest rates, including changes in the shape of yield curves when valuing interest rate sensitive investments and derivatives relative to fair value of insurance liabilities. It includes also other interest-rate sensitive balance sheet items such as liabilities investment contracts, debt issued by the Group, commercial and residential mortgages, employee benefit plans, and loans and receivables.

The Group manages credit-spread risk, which describes the sensitivity of the values of assets and liabilities due to changes in the level or the volatility of credit spreads, over the risk-free interest rate yield curves. Movements of credit spreads are driven by several factors including changes in expected default probability, default losses, risk premium, liquidity and other effects.

Returns on unit-linked contracts, whether classified as insurance or investment contracts, are at the risk of the policyholder; however, the Group is exposed to fluctuations in interest rates and credit spreads in so far as they affect the amount of fee income earned if the fee income level is dependent on the valuation of the asset base.

Risk review (continued)

Audited

Analysis of market risk sensitivities for interest rate, equity and credit-spread risks

Group investments sensitivities

The economic market risk sensitivities of the fair value for Group investments before tax as of 2019 was a negative USD 10.9 billion (negative USD 9.9 billion as of 2018) for a 100-basis-point increase in interest rate. For a 100-basis-point decrease in interest rate, the sensitivity was USD 12.7 billion in 2019 (USD 11.1 billion as of 2018). For a 10 percent decline in equity market, Group investments dropped in value by USD 1.3 billion in 2019 compared with USD 1.1 billion as of 2018. A 100-basis-point increase in credit spreads resulted in a decrease of USD 5.7 billion in 2019 compared with USD 5.2 billion as of 2018.

The following describes limitations of the Group investment sensitivities. Group sensitivities show the effects of a change of certain risk factors, while other assumptions remain unchanged. The interest rate scenarios assume a parallel shift of all interest rates in the respective currencies. They do not take into account the possibility that interest rate changes might differ by rating class; these are disclosed separately as credit spread risk sensitivities. The sensitivity analysis is based on economic assets, and not on shareholders' equity or net income as set out in the consolidated financial statements. The sensitivities only cover Group investments, not insurance or other liabilities. The equity market scenarios assume a concurrent movement of all stock markets. The sensitivity analysis does not take into account actions that might be taken to mitigate losses. Actions may involve changing the asset allocation, for example through selling and buying assets. The sensitivities do not indicate a probability of such events occurring in the future. They do not necessarily represent the Group's view of expected future market changes.

In addition to the sensitivities, management uses stress scenarios to assess the impact of more severe market movements on the Group's financial condition. For more information on stress scenarios, see Group economic net asset sensitivities (unaudited), below.

Group economic net asset sensitivities

Basis of presentation – Property & Casualty, Life, and rest of the business

The basis of the presentation for tables 4, 5, and 6 is an economic valuation represented by the fair value for Group investments. IFRS insurance liabilities are discounted at risk-free market rates to reflect the present value of insurance liability cash flows and other liabilities, for example, own debt. The Group describes risk-free market rates as swap rates. In the sensitivities, own debt does not include subordinated debt, which Zurich considers available to protect policyholders in a worst-case scenario.

The basis of presentation for the Life business to financial market movements uses replicating portfolios. The replicating portfolios are portfolios of assets that replicate the cash flows or present values of the life insurance liabilities under stochastic scenarios from the embedded value models. They are calibrated to match dependencies of life insurance liabilities on developments in the financial markets, in respect of interest rates, equity and property. The options and guarantees of the underlying life insurance liabilities are captured through the inclusion of options in the replicating portfolios.

The net impact – the difference between the impact on Group investments and liabilities – represents the economic risk related to changes in market risk factors that the Group faces. Tables 4, 5 and 6 show the estimated economic market risk sensitivities of the net impact. Positive values represent an increase in the balance, and values in parentheses represent a decrease. Mismatches in changes in value of assets relative to liabilities represent an economic risk to the Group.

In determining the sensitivities, investments and liabilities are fully re-valued in the given scenarios. Each instrument is re-valued separately, taking the relevant product features into account. Non-linear effects, where they exist, are reflected in the model. The sensitivities are shown before tax. They do not include the impact of transactions within the Group.

Sensitivities for the rest of the business include Farmers, Group Finance and Operations, and Non-Core Businesses.

Risk review (continued)

Analysis of economic sensitivities for interest-rate risk

Table 4 shows the estimated net impact before tax of a 100 basis point increase or decrease in yield curves after consideration of hedges in place, as of December 31, 2019 and 2018.

Table 4			
Economic interest rate sensitivities*	in USD millions, as of December 31		
		2019	2018
	100 basis point increase in the interest rate yield curves		
	Property & Casualty	(61)	(180)
	Life	1,045	655
	Rest of the business	(155)	(192)
	100 basis point decrease in the interest rate yield curves		
	Property & Casualty	(165)	(8)
	Life	(3,107)	(2,103)
	Rest of the business	230	151

Analysis of economic sensitivities for equity risk

Table 5 shows the estimated net impact before tax from a 10 percent decline in stock markets, after consideration of hedges in place, as of December 31, 2019 and 2018.

Table 5			
Economic equity price sensitivities*	in USD millions, as of December 31		
		2019	2018
	10% decline in stock markets		
	Property & Casualty	(598)	(593)
	Life	(518)	(395)
	Rest of the business	(80)	(83)

Analysis of economic sensitivities for credit spread risk

Table 6 shows the estimated net impact before tax from a 100 basis points increase in corporate credit spreads, as of December 31, 2019 and 2018. The sensitivities apply to all fixed income instruments, excluding government, supranational and similar debt securities. For Life business the loss-absorbing capacity of liabilities for losses on credit spreads are not included, as they are not modeled in the replicating portfolios.

Table 6			
Economic credit spread sensitivities*	in USD millions, as of December 31		
		2019	2018
	100 basis point increase in credit spreads		
	Property & Casualty	(1,629)	(1,614)
	Life	(3,640)	(3,048)
	Rest of the business	(522)	(338)

* Limitations of the economic sensitivities: same limitations apply as for Group investments sensitivities, except that the above sensitivities are based on economic net assets including liability representation: see Note 1 of the consolidated financial statements.

Risk review (continued)

Audited

Risks from defaults of counterparties

Debt securities

The Group is exposed to credit risk from third-party counterparties where the Group holds securities issued by those entities. The default risk is controlled by Group counterparty-concentration risk limits keeping the size of potential losses to an acceptable level.

Table 7

Debt securities by rating of issuer

as of December 31

Rating	2019		2018	
	USD millions	% of total	USD millions	% of total
AAA	36,066	24.5%	35,283	25.2%
AA	37,062	25.1%	37,362	26.7%
A	22,812	15.5%	20,998	15.0%
BBB	44,918	30.5%	39,529	28.3%
BB and below	5,342	3.6%	5,341	3.8%
Unrated	1,308	0.9%	1,357	1.0%
Total	147,507	100.0%	139,870	100.0%

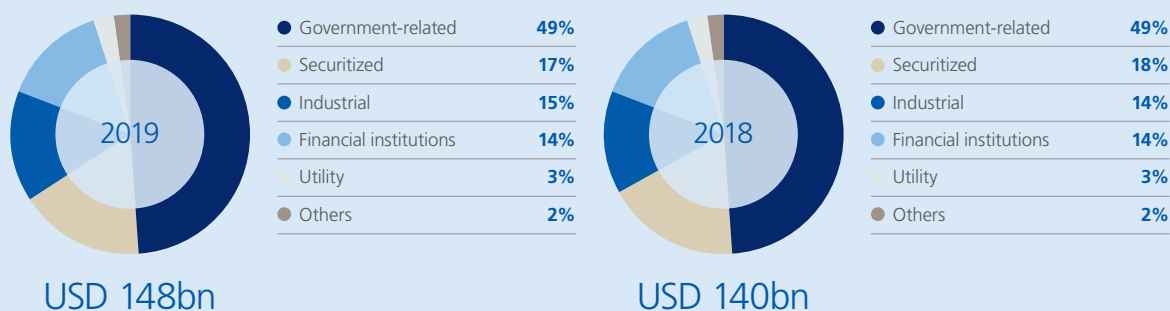
Table 7 shows the credit-risk exposure of debt securities, by credit rating. As of December 31, 2019, 95.5 percent of the Group's debt securities was investment grade and 24.5 percent was rated 'AAA.' As of December 31, 2018, 95.2 percent of debt securities was investment grade and 25.2 percent was rated 'AAA.'

Exposure-level limits are in place and are based on default and recovery rates that tighten progressively for lower ratings. Where the Group identifies investments expected to trigger limit breaches, appropriate actions are implemented.

The risk-weighted average credit rating of the Group's debt securities portfolio is 'A-' in 2019, compared with 'A-' in 2018.

Debt securities – credit risk concentration by industry

%, as of December 31



As of December 31, 2019, the largest concentration in the Group's debt securities portfolio was government-related at 49 percent of all debt securities. In all other categories, a total of USD 30.2 billion (41 percent) was secured. As of December 31, 2018, 49 percent of the Group's debt portfolio was invested in government-related securities. In all other categories, a total of USD 31.4 billion (44 percent) was secured.

The second-largest concentration in the Group's debt securities portfolio is securitized, including structured finance securities and covered bonds.

In addition to debt exposure, the Group had loan exposure of USD 4.1 billion and USD 4.4 billion to the German central government or the German federal states as of December 31, 2019 and 2018, respectively. For more information, see the 'mortgage loans and other loans' section.

Risk review (continued)

Audited

Cash and cash equivalents

To reduce concentration, settlement and operational risks, the Group limits the amount of cash that can be deposited with a single counterparty. The Group also maintains an authorized list of acceptable cash counterparties.

Cash and cash equivalents amounted to USD 7.9 billion as of December 31, 2019 and USD 8.6 billion as of December 31, 2018. The risk-weighted average rating of the overall cash portfolio was 'A-' as of December 31, 2019 and 'A-' as of December 31, 2018. The ten largest bank exposures represent 74 percent of the total, whose risk-weighted average rating was 'A' as of December 31, 2019 and 'A+' as of December 31, 2018.

Mortgage loans and other loans

Mortgage loans amounted to USD 5.9 billion as of December 31, 2019 and USD 6.6 billion as of December 31, 2018. The Group's largest mortgage loan portfolios are held in Switzerland (USD 3.2 billion) and in Germany (USD 1.9 billion); these are predominantly secured against residential property but also include mortgages secured by commercial property. The Group invests in mortgages in the U.S. (USD 0.6 billion); these are mainly participations in large mortgage loans secured against commercial property.

The credit risk arising from other loans is assessed and monitored together with the debt securities portfolio. Out of the USD 8.3 billion reported loans as of December 31, 2019, 54 percent are government-related, of which 92 percent are to the German central government or the German federal states. As of December 31, 2019, USD 4.5 billion were rated as 'AAA' (55 percent) compared with 4.7 billion as of December 31, 2018; USD 1.6 billion as 'AA' (20 percent) compared with 0.7 billion as of December 31, 2018; USD 0.3 billion as 'A' (3 percent) compared with 0.3 billion as of December 31, 2018; USD 1.3 billion as 'BBB' and below (16 percent) compared with 1.2 billion as of December 31, 2018; and USD 0.5 billion as unrated (6 percent) compared with 0.7 billion as of December 31, 2018.

Derivatives

The replacement value of outstanding derivatives represents a credit risk to the Group. These instruments include interest rate and cross-currency swaps, forward contracts and purchased options. A potential exposure could also arise from possible changes in replacement values. The Group regularly monitors credit risk exposures arising from derivative transactions. Outstanding positions with external counterparties are managed through an approval process embedded in derivative programs.

To limit credit risk, derivative financial instruments are typically executed with counterparties rated 'A-' or better by an external rating agency, unless collateral is provided as per Zurich's risk policy manuals. The Group's standard practice is to only transact derivatives with those counterparties for which the Group has in place an ISDA Master Agreement, with a Credit Support Annex. This mitigates credit exposures from over-the-counter transactions due to close-out netting and requires the counterparty to post collateral when the derivative position exceeds an agreed threshold. The Group further mitigates credit exposures from derivative transactions by using exchange-traded or centrally cleared instruments whenever possible.

Risk from currency exchange rates

Currency risk is the risk of loss resulting from changes in exchange rates. The Group operates internationally and therefore is exposed to the financial impact of changes in the exchange rates of various currencies. The Group's presentation currency is the U.S. dollar, but its assets, liabilities, income and expenses are denominated in many currencies, with significant amounts in euro, Swiss franc and British pound, as well as the U.S. dollar.

On local balance sheets a currency mismatch may cause a balance sheet's net asset value to fluctuate, either through income or directly through equity. The Group manages this risk by matching foreign currency positions on local balance sheets within prescribed limits. Residual local mismatches are reported centrally to make use of the netting effect across the Group. Zurich hedges these residual local mismatches within an established limit through a central balance sheet. For information on net gains/losses on foreign currency transactions included in the consolidated income statements, see note 1 of the consolidated financial statements. The monetary currency risk exposure on local balance sheets is considered immaterial.

Differences arise when functional currencies are translated into the Group's presentation currency, the U.S. dollar. The Group applies net investment hedge accounting to protect against the impact that changes in certain exchange rates might have on selected net investments.

Table 8 shows the total IFRS equity's sensitivity to changes in exchange rates for the main functional currencies to which the Group is exposed. Positive values represent an increase in the value of the Group's total equity. See notes 1, 3 and 7 of the consolidated financial statements for additional information on foreign currency translation and transactions.

Risk review (continued)

Audited

Table 8

Sensitivity of the Group's total IFRS equity to exchange rate fluctuations	in USD millions, as of December 31		
	10% increase in		
		2019	2018
	EUR/USD rate	382	336
	GBP/USD rate	270	215
	CHF/USD rate ¹	529	482
	BRL/USD rate	178	163
	AUD/USD rate ²	308	130
	Other currencies/USD rates ¹	510	439

¹ The 2018 figures have been updated.

² AUD/USD rate sensitivity has been included in 2019 due to the impact of the OnePath acquisition on the Group.

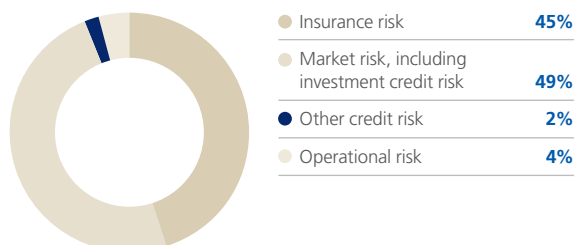
The sensitivities show the effects of a change of the exchange rates only, while other assumptions remain unchanged. The sensitivity analysis does not take into account management actions that might be taken to mitigate such changes. The sensitivities do not indicate a probability of such events occurring in the future. They do not necessarily represent Zurich's view of expected future market changes. While table 8 shows the effect of a 10 percent increase in currency exchange rates, a decrease of 10 percent would have the converse effect.

Risk review (continued)

Other credit risk

Section highlights

Total Z-ECM capital required: USD 34.4 billion
%, as of July 1, 2019



Key risk and capital indicators

Z-ECM, in USD billions	July 1, 2019	January 1, 2019
Reinsurance credit risk	0.7	0.8

Audited

Credit risk is the risk associated with a loss or potential loss from counterparties failing to fulfill their financial obligations. See section 'risks from defaults of counterparties' for market-risk-related asset categories. The Group's exposure to other credit risk is derived from the following main categories of assets:

- Reinsurance assets
- Receivables

The Group's objective in managing credit risk exposures is to maintain them within parameters that reflect the Group's strategic objectives, and its risk appetite and tolerance. Sources of credit risk are assessed and monitored, and the Group has policies to manage specific risks within various subcategories of credit risk. To assess counterparty credit risk, the Group uses ratings assigned by external rating agencies, qualified third parties such as asset managers, and internal rating assessments. If external rating agencies' ratings differ, the Group generally applies the lowest, unless other indicators justify an alternative, which may be an internal credit rating.

The Group regularly tests and analyzes credit risk scenarios and prepares possible contingency measures that may be implemented if the credit risk environment worsens.

The Group actively uses collateral to mitigate credit risks. Nevertheless, underlying credit risks are managed independently from the collateral. The Group has limits and quality criteria to identify acceptable letter-of-credit providers. Letters of credit enable Zurich to limit the risks embedded in reinsurance, captives, deductibles, trade credit and surety.

The Group has counterparty limits, which are regularly monitored. Exposure to counterparties' parent companies and subsidiaries is aggregated to include reinsurance assets, investments, derivatives, and certain insurance products. There was no unapproved material exposure in excess of the Group's limits for counterparty aggregation as of December 31, 2019 nor December 31, 2018.

On-balance sheet exposures are the main source of credit risk. Off-balance sheet credit exposures are related primarily to certain insurance products, reinsurance and collateral used to protect underlying credit exposures on the balance sheet. The Group also has off-balance sheet exposures related to undrawn loan commitments of USD 1.5 million and USD 2.0 million as of December 31, 2019 and 2018, respectively. See note 22 of the consolidated financial statements for undrawn loan commitments.

Risk review (continued)

Audited

Credit risk related to reinsurance assets

The Group's Corporate Reinsurance Security Committee manages the credit quality of cessions and reinsurance assets. The Group typically cedes new business to authorized reinsurers with a minimum rating of 'A-'. As of December 31, 2019 and 2018 respectively, 57 percent and 52 percent of the exposure ceded to reinsurers that are rated below 'A-' or are not rated, was collateralized. Of the exposure ceded to reinsurers that are rated below 'A-' or are not rated, 65 percent was ceded to captive insurance companies in 2019, and 50 percent in 2018.

Reinsurance assets included reinsurance recoverables (the reinsurers' share of reserves for insurance contracts) of USD 22.8 billion and USD 21.3 billion, and receivables arising from ceded reinsurance of USD 1.5 billion and USD 1.1 billion as of December 31, 2019 and 2018, respectively, gross of allowance for impairment. Reserves for potentially uncollectible reinsurance assets amounted to USD 119 million as of December 31, 2019 and USD 113 million as of December 31, 2018. The Group's policy on impairment charges takes into account both specific charges for known situations (e.g., financial distress or litigation) and a general, prudent provision for unanticipated impairments.

Reinsurance assets in table 9 are shown before taking into account collateral such as cash or bank letters of credit and deposits received under ceded reinsurance contracts. Unsecured reinsurance assets shown are after deducting collateral. Except for an immaterial amount, letters of credit are from banks rated 'A-' or better. Collateral increased by USD 0.7 billion to USD 10.3 billion per December 31, 2019, compared with 2018.

Table 9 shows reinsurance assets and unsecured reinsurance assets split by rating.

Table 9

Reinsurance assets and unsecured reinsurance assets by rating of reinsurer and captive

as of December 31

Rating	2019								2018
	Reinsurance assets				Unsecured reinsurance assets				
	USD millions	% of total	USD millions	% of total	USD millions	% of total	USD millions	% of total	
AAA	6	0.0%	6	0.0%	9	0.0%	9	0.1%	
AA	7,084	29.3%	6,309	45.7%	5,633	25.3%	5,173	40.8%	
A	10,957	45.4%	4,871	35.3%	10,882	48.9%	4,740	37.4%	
BBB	2,356	9.8%	1,095	7.9%	1,572	7.1%	983	7.8%	
BB	335	1.4%	195	1.4%	447	2.0%	232	1.8%	
B and below	256	1.1%	29	0.2%	645	2.9%	37	0.3%	
Unrated	3,163	13.1%	1,308	9.5%	3,085	13.9%	1,510	11.9%	
Total¹	24,157	100.0%	13,812	100.0%	22,273	100.0%	12,685	100.0%	

¹ The value of the collateral received amounts to USD 10.3 billion and USD 9.6 billion as of December 31, 2019 and 2018, respectively.

Credit risk related to receivables

The Group's largest credit-risk exposure to receivables is related to third-party agents, brokers and other intermediaries. It arises where premiums are collected from customers to be paid to the Group, or to pay claims to customers on behalf of the Group. The Group has policies and standards to manage and monitor credit risk related to intermediaries. The Group requires intermediaries to maintain segregated cash accounts for policyholder money. The Group also requires that intermediaries satisfy minimum requirements of capitalization, reputation and experience, and provide short-dated business credit terms.

Receivables that are past due but not impaired should be regarded as unsecured, but some of these receivable positions may be offset by collateral. The Group reports internally on Group past-due receivable balances and strives to keep the balance of past-due positions as low as possible, while taking into account customer satisfaction.

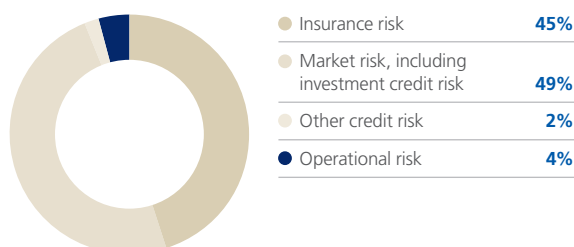
Receivables from ceded reinsurance are part of reinsurance assets and are managed accordingly. See notes 15 and 24 of the consolidated financial statements for additional information on receivables.

Risk review (continued)

Operational risk

Section highlights

Total Z-ECM capital required: USD 34.4 billion
%, as of July 1, 2019



Key risk and capital indicators

Z-ECM, in USD billions	July 1, 2019	January 1, 2019
Operational risk	1.3	1.2

Audited

Operational risk is the risk of financial loss or gain, adverse reputational, legal or regulatory impact, resulting from inadequate or failed processes, people, systems or from external events, including external fraud, catastrophes, or failure in outsourcing arrangements. Zurich has a framework to identify, assess, manage, monitor, and report operational risk within the Group. Within this framework, the Group:

- Uses a scenario-based approach to assess, model and quantify the capital required for operational risk for business units under extreme circumstances. This approach allows information to be compared across the Group and highlights the main scenarios contributing to the Z-ECM capital required.
- Documents and reviews operational events exceeding a threshold determined per Zurich's risk policy manuals. Remedial action is taken to avoid the recurrence of such operational events.
- Conducts risk assessments where operational risks are identified for key business areas. Risks identified and assessed above a certain threshold must have a risk response. Risk mitigation plans are documented and tracked on an ongoing basis. In the assessments, the Group uses sources of information such as the Total Risk Profiling™ process, internal control assessments, and audit findings, as well as scenario modeling and operational event data.

The Group has specific processes and systems in place to focus on high-priority operational matters such as managing information security and operational resilience (see sub-section digital and resilience risk, information security and operational resilience), as well as combating fraud.

Preventing, detecting and responding to fraud are embedded in Zurich's business processes. Both claims and non-claims fraud are included in the common framework for assessing and managing operational risks. For Z-ECM calculations, claims fraud is part of insurance risk and non-claims fraud is part of operational risk.

Group overview	Governance	Risk review	Financial review
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Risk review (continued)

Risk management and internal controls

The Group considers internal control to be key for managing operational risk. The Board has overall responsibility for the Group's risk management and internal control frameworks. The objectives of the Group's internal control system are to provide reasonable assurance that Zurich's financial statements and disclosures are materially correct, support reliable operations, and to ensure legal and regulatory compliance. The internal control system is designed to mitigate rather than eliminate the risk that business objectives might not be met. Key controls are assessed for their design and operating effectiveness.

The Group promotes risk awareness and understanding of controls through communication and training. Risk management and internal control systems are designed at Group level and implemented Group-wide.

Management, as the first line of defense, is responsible for identifying, evaluating and managing risk, and designing, implementing and maintaining internal control. Key processes and controls in the organization are subject to review and challenge by management, Group Risk Management, Group Compliance and Group Audit. Control issues of Group-level significance and associated mitigation actions are reported regularly to the Audit Committee of the Board. The Risk and Investment Committee of the Board reviews the effectiveness of the Group's risk management system, including the Group's risk tolerance and enterprise-wide risk governance framework, in accordance with the charter for each committee.

The Group's Disclosure Committee, chaired by the Head of Group Financial Accounting and Reporting, assesses the content, accuracy and integrity of the disclosures and the effectiveness of the internal controls over financial reporting. The conclusions result in a recommendation to the Group Chief Financial Officer to release the financial disclosures to the Audit Committee of the Board, who may then challenge further. The Board reviews and approves the announcement of the results and the annual report before they are made public.

The internal and external auditors also regularly report conclusions, observations and recommendations that arise as a result of their independent reviews and testing of internal controls over financial reporting and operations.

Risk review (continued)

Audited

Liquidity risk

Liquidity risk is the risk that the Group may not have sufficient liquid financial resources to meet its obligations when they fall due, or would have to incur excessive costs to do so. Zurich's policy is to maintain adequate liquidity and contingent liquidity to meet its liquidity needs under normal conditions and in times of stress. To achieve this, the Group assesses, monitors and manages its liquidity needs on an ongoing basis.

Group-wide liquidity management policies and specific guidelines govern how local businesses plan, manage and report their local liquidity and include regular stress tests for all major legal entities and branches within the Group. The stress tests use a standardized set of internally defined stress events, and are designed to provide an overview of the potential drain on liquidity if the Group had to recapitalize local balance sheets. Similar guidelines apply at the Group level, and detailed liquidity forecasts are regularly conducted, based on local businesses' input and the Group's forecasts. As part of its liquidity management, the Group maintains sufficient cash and cash equivalents and high-quality, liquid investment portfolios to meet outflows under expected and stressed conditions. The Group also maintains internal liquidity sources that cover the Group's potential liquidity needs, including those that might arise in times of stress. The Group takes into account the amount, availability and speed at which these sources can be accessed. The Group has access to diverse funding sources to cover contingencies, including asset sales, external debt issuance and making use of committed borrowing facilities or letters of credit. The Group maintains a range of maturities for external debt securities. A potential source of liquidity risk is the effect of a downgrade of the Group's credit rating. This could affect the Group's commitments and guarantees, potentially increasing liquidity needs. This risk, and mitigating actions that might be employed, are assessed on an ongoing basis within the Group's liquidity framework.

The Group regularly analyzes the liquidity of the investment assets and ensures that the liquidity of assets stays in line with liquidity requirements. During 2019, the Group was within its capacity to hold illiquid assets.

For more information on debt obligation maturities, see note 18 of the consolidated financial statements, and for information on commitments and guarantees, see note 22 of the consolidated financial statements.

The Group's ongoing liquidity monitoring includes regular reporting to the executive management and quarterly reporting to the Risk and Investment Committee of the Board, covering aspects such as the Group's actual and forecast liquidity, possible adverse scenarios that could affect the Group's liquidity and possible liquidity needs from the Group's main subsidiaries, including under conditions of stress.

For more information on the Group's other financial liabilities, see note 16 of the consolidated financial statements. See note 6 of the consolidated financial statements for information on the maturity of debt securities.

The Group has committed to contribute capital to subsidiaries and third parties that engage in making investments in direct private equity and private equity funds. Commitments may be called by the counterparty over the term of the investment (generally three to five years) and must be funded by the Group on a timely basis. See note 22 of the consolidated financial statements.

Risk review (continued)

Audited

Strategic risk and risks to the Group's reputation

Strategic risk

Strategic risk corresponds to the risk that Zurich is unable to achieve its strategic targets.

Strategic risks can arise from:

- ▶ Inadequate risk-reward assessment of strategic plans
- ▶ Improper execution of strategic plans
- ▶ Unexpected changes to underlying assumptions

Zurich defines the strategy as the long-term plan of action designed to allow the Group to achieve its goals and aspirations based on Zurich's purpose and values and strategic options.

The Group works to reduce unintended risks of strategic business decisions through its risk assessment processes and tools, including the Total Risk Profiling™ process. As part of the annual assessment of strategic risks, the Executive Committee (ExCo) assessed potential risks from both external and internal factors, looking at 2020 and beyond. These include: macro-economic risks such as financial stress due to geopolitical uncertainties and monetary policy with impacts primarily on insurance and market risk; adoption to post-Brexit legal and regulatory regime; adequately transform propositions and approaches for new customer segments and other changes affecting competitiveness in markets where Zurich is active; and information security including cyber and business resilience risks. The ExCo has defined actions to respond as appropriate and reviews changes to the key risks and their status of actions at least quarterly.

The Group evaluates the risks of merger and acquisition (M&A) transactions both from a quantitative and a qualitative perspective. The Group conducts risk assessments of M&A transactions to evaluate risks specifically related to integrating acquired businesses.

Risks to the Group's reputation

Risks include acts or omissions by the Group or any of its employees that could damage the Group's reputation or lead to a loss of trust among its stakeholders. Every risk type has potential consequences for Zurich's reputation. Effectively managing each risk type supports preventing adverse reputation outcomes.

The Group aims to preserve its reputation by adhering to applicable laws and regulations, by following the core values and principles of the Group's code of conduct that promote integrity and good business practice, and by living up to its sustainability commitments. The Group centrally manages certain aspects of reputation risk, for example, communications, through functions with the appropriate expertise. Potential risks to Zurich's reputation are included in its risk assessment processes and tools, including the TRP process.

Sustainability risk



Zurich's ambition is to be known as one of the most responsible and impactful businesses in the world. Trends like globalization, the mobility of talent and funds, shifting geopolitics, reskilling for a digital workforce, demographics, and climate change all pose immensely complex social issues. These issues demand solutions from an increasingly stretched set of governmental and multilateral institutions.

Sustainability risks are also becoming more complex and interconnected as a result of these trends. Insurers are increasingly expected to be agents of change and play a more impactful role in addressing these societal issues and interconnected risks.

Zurich works with its customers and investee companies to ensure responsible and sustainable business practices while promoting best practices in managing environmental, social, and governance (ESG) risks. The Group has policies in place that define the ESG topics for which Zurich has no underwriting or investment appetite. Zurich continuously works to develop relevant products and services that help solve today's most pressing societal and environmental issues.

Risk review (continued)

Sustainability risk framework

To support the Group's businesses in applying its purpose and values as well as mitigating reputational risk impacts, Zurich has established a systematic and integrated approach to identifying, assessing and recommending action on potential risk and opportunity areas from a sustainability perspective across all the Group's activities, but in particular in Group Investment Management and Group underwriting.

This is a three step process:

- ▶ **Issue identification:** identify relevant issues, by monitoring channels such as media and social media, as well as information from non-government organizations (NGOs), Zurich's businesses, and identify issues to be taken up within the risk assessment process.
- ▶ **Risk assessment:** assess issues related to public commitments, the role of insurance underwriting, market exposure and materiality. The executive committee (ExCo) approves position statement on issues, recommends business actions, and issues for reputational management considerations.
- ▶ **Implementation:** implement mitigation actions and reputational action plans locally in the businesses. Mobilize expert support available across the Group and escalate as necessary, according to governance procedures.

Zurich's underwriting and investment activities apply those positions across portfolios based on stated thresholds and verified third-party data. Wherever possible, for customers that are on the margins of Zurich's thresholds, Zurich engages and works together with customers to ensure responsible and sustainable business practices. This engagement period may be short, but in some cases can be for a period of up to two years, depending on which part of the renewal cycle customers are in and the time required for them to demonstrate credible progress on ESG issues.

Clear roles and responsibilities, starting with the Zurich Insurance Group Ltd Board of Directors and including the Zurich management, aim to ensure effective oversight and action with respect to climate change and other sustainability risks.

Zurich's Sustainability Leaders Council ensures that its approach to sustainability is effectively integrated in the way business is conducted and enables Zurich to live up to its code of conduct, its purpose and values, and the United Nations (UN) Global Compact. The Council comprises senior executives from across the business and is chaired by the Group Head of Public Affairs and Sustainability.

Climate-change risk

Climate change is perhaps the most complex risk facing society today: it is intergenerational, international and interdependent. As a global insurer, Zurich faces risks from climate change and provides this disclosure per its commitment to adopt the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

Climate strategy

Zurich's climate strategy is guided by its commitment to the business ambition for 1.5°C pledge aimed at limiting average global temperature increases to 1.5°C. A comprehensive climate road-map to transform Zurich into a 1.5°C compatible company is under development, with the goal to protect the Group's balance sheet, capture climate-related service and product revenues by supporting our customers and society to build resilience to climate impacts and transition to a zero-carbon economy.

Climate-related physical risks

Changes are expected in the frequency, severity and geographical distribution of extreme weather events such as tropical cyclones and extreme rainfall and associated flooding or heat waves in the event that society fails to limit climate change to well below an increase of two degrees Celsius. Scientific consensus suggests society is likely to experience devastating impacts as a result of these changes. Current climate models, such as the International Panel on Climate Change (IPCC) model upon which Zurich bases its internal climate scenarios, indicate that physical climate-change risk will begin to rise more materially after the next two decades if left unmitigated.

Over the short term, natural climate variability will have a greater impact on natural catastrophe losses than long-term climate-change trends. Regional variations will be large, however, areas that are particularly exposed are likely to experience such changes earlier. To accommodate the evolving nature of climate risk, Zurich considers both near-term (three to five year) and long-term (five to 10 year) time horizons, with the long-term view used as a basis to develop mitigating actions. Overall the Group considers its near-term (less than five years) climate-change-related risks to be manageable and foreseeable, whereas long-term risks to be elevated and highly uncertain.

Risk review (continued)

Zurich is exposed to physical risk of climate change through the underwriting and real estate investment portfolios. While assessing and managing the impact of extreme weather events is part of Zurich's core business competency, changes in frequency and severity of events caused by climate change add to the challenges in accurately measuring expected impacts. As commercial catastrophe models are typically based on historical data and hence backward-looking, they might not sufficiently account for climate risks already materializing. Potential model gaps are addressed as part of Zurich's model validation process and the Zurich view approach provides further review for impacts that Zurich considers under-represented in the standard models. Generally, annual policy renewals provide a degree of insulation against increasing physical risks for short-tail business. However, the ability to isolate gradual changes to the risk (e.g., a change in frequency, severity or correlations), and therefore capture the impacts of a changing climate, become more pressing over a longer time-frame, especially for long-tail lines of business.

There is also a risk that physical events reduce the profitability of investments across asset classes (e.g., equities, real estate, sovereign or corporate bonds), though analysis suggests that very significant impairments would be required for Zurich's portfolio to be materially impacted.

Zurich considers the risk to its own operations from climate risk as less material, as they are generally not located in highly exposed areas and business continuity plans are in place to react to relevant extreme weather events.

Climate-related transition risk

Each major economy is likely to respond to transition risks in specific ways, and within different time periods. Shifts toward a low-carbon economy carried out in specific sectors are likely to affect not only those individual sectors, but other parts of the economy as well. There are at least three aspects to consider within this transition process; its affect on technologies, economies, and society. The insurable risks related to these transitions could develop in many different ways.

Achieving a transition to a low-carbon economy requires fundamental changes to all parts of the economy. While limiting climate change to 2°C or below will lower physical climate risk, the technological and policy changes required to achieve this create their own sets of risks. Independent of the precise pathway, the transition could be disruptive, as significant asset price moves are required to shift resources to low-carbon technology on a global scale. Changes in public perception and the regulatory landscape could reshape legal and reputational risks. Transition risks are considered to be more uncertain than physical risks. Zurich uses a climate scorecard to measure transition-risk-related indicators, with Zurich's assessment indicating that a physical risk path currently is significantly more likely than a transition path. However, transition risks and physical risks are not mutually exclusive and can potentially co-exist, depending on the timing, speed and effectiveness of the path followed.

Zurich could be exposed to transition risks if it fails to manage changing market conditions and customer needs as part of the transition to a low-carbon economy, resulting in asset impairment, opportunity cost and lost market share. In a transition scenario, industries unable to de-carbonize could experience declining profitability and lack of re-financing, which could lead to a lack of maintenance with increasing rates of outages and equipment break-downs that translate into higher insurance losses. Failure to manage transition risk could also lead to reputational impacts, both internal and external, resulting from a failure to deliver on publicly stated commitments. Although not considered material in the near-term, the increasing frequency of climate-related legal action suggests climate-related litigation could represent a significant potential risk in the long term.

While transition risks are not considered material in the short term, strategic responses to these risks are underway. These include the definition of an overall differentiated market position on climate change that is tied to the Group's purpose and values, and the development of an underpinning suite of products and services that complement its existing responsible investment strategy. Zurich recently signed-up to the United Nations global compact business ambition for 1.5°C pledge limiting average global temperature increases to 1.5°C. The implementation of this will further reduce the Group's exposure to transition risk.

Climate-related opportunities

Zurich sees business opportunities both in helping its customers manage physical risk and transition risk, as well as benefiting from the changes required to move towards a low-carbon economy. As an innovative insurer, Zurich is positioned to take advantage through its climate-change-related products and services which enable existing and prospective customers to better understand and manage their exposure to climate risks and to enhance their resilience to both physical and transition risk.

Risk review (continued)

Climate-related regulations aimed at incentivizing a low-carbon economy result in an increased demand for alternative low-carbon solutions and provide opportunities for new markets. The impact which is currently expected to be low in the short to medium-term, will increase over time. Zurich has considerable expertise in providing insurance solutions for green assets and takes advantage of environmentally oriented opportunities through products and services for electric vehicles, renewable energy, etc., around the world. For example, electric vehicles (EV) are expected to be a significant and growing segment in the new vehicle market with Zurich leading the way in developing customized motor insurance solutions that meet the needs of EV customers.

As an investor, Zurich has established responsible investment and climate-change investment strategies, including impact investments, green bonds, and a comprehensive approach to ESG integration. Impact investments can help mitigate climate change through their targeted, positive impact, and also offer a financial return commensurate with risks. Zurich will consider impact investments that help increase energy efficiency, generate renewable energy or mitigate climate change or protect the environment in other ways. Through its commitment to the green bonds market, Zurich is seeking to capture opportunities across the universe of environmental oriented, social and sustainable bonds.

Risk management

Zurich's approach to managing climate risk is embedded within its multi-disciplinary Group-wide risk management processes. As such, climate risk is managed in a manner consistent with how other risks to the Group are managed. Under the sponsorship of the Group CRO, Zurich conducts an annual Group-wide assessment of climate-change-related risks using the Total Risk Profile (TRP™) approach. This assessment, involving subject matter experts from relevant business areas, includes identifying management actions appropriate to the risks identified.

Internal scenarios representing an archetypical-transition path and a physical-risk path provide the assumptions underlying the assessment. Zurich developed a climate-change scorecard, which aims to measure developments in a range of climate-transition-related areas. It uses quantitative data and draws on various climate-change scenarios constructed by the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA). To assess financial impacts of potential climate scenarios, climate risks are also assessed as part of its Own Risk and Solvency Assessment (ORSA) and this year it included a scenario based on the rapid implementation of economic and other policies to stress-test potential transition risk exposure.

For more information on how Zurich manages its liability exposure to climate-related natural catastrophes, see sub-section 'Insurance risk'.

Metrics

Key performance indicators (KPIs) for sustainability focus areas were defined to ensure continuous improvement in performance on responsible business practices. The metrics in place are designed to track the mitigation of operational and investment related risks. Latest data for these metrics, along with historical data to facilitate trend analysis, can be found on the webpage. <https://www.zurich.com/sustainability/being-a-responsible-business/measuring-our-progress>

Risk review (continued)

Digital and resilience risk

Digital transformation and technological advances have not only created a wide spectrum of benefits for society but also amplified risks that need to be understood and managed. Assessing cyber risk, information and data security risk, risks arising from emerging technologies and innovation in the digital space remain a key focus in determining the Group's exposure to risks resulting from digital transformation. Based on a dedicated framework, these assessments support delivering assurance, risk insights and oversight, and make use of enhanced capabilities to ensure the Group's resilience.

Holistic and interdisciplinary approach

By applying a holistic approach to assessing digital trends, the Group provides new risk insights that enable Zurich to achieve a rapid and resilient digital transformation. In order to ensure effective governance and monitoring, on-going proactive, pragmatic and solution-oriented approaches focus on risk and controls with a strong emphasis on enabling the business while safeguarding the enterprise from risks in the digital space.

Cyber and technology risk

The relevance of technological risks such as cyber risk is rapidly increasing across all data-driven industries. Exposure to these risks has grown in lockstep with the significant rise in digital services provided directly to customers and the increasing prevalence of digital ecosystems and cloud solutions in today's interconnected world. On a continuous basis, Zurich assesses and monitors exposure to defined information security and cyber risk scenarios through key risk indicators (KRIs) to effectively focus on actions and adequate resource allocation.

Data risk

The strategic relevance of data as a business asset is rising at a rapid pace and the risks associated with data management are growing more and more prominent. Preventing risks such as data losses and privacy breaches, and assessing and monitoring the potential misuse of data and losses triggered by failures in data management remain in focus. Specifically, appropriate governance of data for business purposes and decision-making processes, including automation, machine-learning techniques and other advanced technologies are a priority. As Zurich strives to inspire confidence in a digital society with its data commitment, assurance on the ethical use of advanced technologies is provided from a risk management perspective for the protection and privacy of data of our customers and all other stakeholders.

Third-party and transformation risk

Outsourcing and the engagement with third parties introduces risks relevant to the delivery of our strategy, such as data loss or disclosure, disruption to critical customer services and regulatory compliance. Digitization has accelerated the complexity and changes to the Group's third party ecosystem. Zurich looks to address risks associated with third-party engagements along its supply and value chain. Applying a consistent Group-wide approach to outsourcing governance is among Zurich's key priorities.

Business resilience risk

Zurich, along with the rest of the insurance industry, is going through a period of transformation in order to meet changing customer expectations. In addition, increasing automation of processes, development of advanced analytics capabilities, and fragmented supply chains have contributed to an increasingly complex operating environment. In response to these challenges and to better protect the interests of our stakeholders, Zurich has initiated a business resilience program which clearly defines resilience-action-plan responsibility, identifies critical business services susceptible to systemic technology failure, integrates its response frameworks, and provides enhanced transparency through a set of KRIs addressing resilience across the organization.

Digital policy – new insights and sustainability

Internal policies for managing digital risk are aligned to Zurich's sustainability strategy and are implemented by the businesses. Zurich's aspires to not only follow but also influence the public policy discourse on digital transformation and innovation risks. Zurich takes an active role in thought leadership in digital risk management across the industry and is committed to strengthening the link between digitization and sustainability, supporting digital literacy to enable effective risk management and it is endorsing the trustworthy use of advanced technologies to make sure the Group's values are adhered to and observed.