

Risk report

Risk governance and risk management system

Risk management organisation

Organisational structure

Munich Re set up a governance system that meets Solvency II requirements. The main elements of this system are the risk management, compliance, audit and actuarial functions. At Group level, risk management is part of the Integrated Risk Management division (IRM) and reports to the Group Chief Risk Officer (Group CRO). In addition to the Group functions, there are risk management units ("mirror functions") in the fields of business.

Risk governance

Our risk governance ensures that an appropriate risk and control culture is in place by clearly assigning roles and responsibilities for all material risks. The Board of Management must consult the risk management function on major decisions to be taken. The appropriateness of our risk governance is reviewed by the Board of Management on a regular basis.

Defining the risk strategy

The risk strategy, which is aligned with Munich Re's business strategy, defines where, how and to what extent we are prepared to incur risks. The further development of our risk strategy is embedded in the annual planning cycle, and hence in our business planning. The risk strategy is approved by the Board of Management, and discussed with both the Audit Committee of the Supervisory Board and the full Supervisory Board as a material element of the own risk and solvency assessment (ORSA) process.

We determine the risk strategy by defining risk tolerances and limits for a number of risk criteria that are based on the capital and liquidity available, and on our business strategy, and provide a frame of reference for the Group's operating divisions.

Implementation of strategy and the risk management cycle

The risk appetite defined by the Board of Management is reflected in our business planning and integrated into the

management of our operations. If capacity shortages or conflicts with the limit system or regulations arise, defined escalation and decision-making processes are followed. These have been designed to ensure that the interests of the business and risk management considerations are weighed and reconciled with each other as far as possible.

Our implementation of risk management at the operational level embraces the identification, analysis and assessment of all material risks. This provides a basis for risk reporting, the control of limits and monitoring.

Risk identification is performed by means of appropriate processes and indicators, which are complemented by expert opinions. At Munich Re, the early identification of risks is primarily operationalised using the emerging risk process. In this process, new or changing risks are discussed with internal and external experts, especially regarding their relevance in terms of occurrence probability, expected loss amount, and potential impact on Munich Re.

As part of the risk analysis, a quantitative and qualitative assessment of all risks at consolidated Group level is made in order to take into account possible interactions between risks across all fields of business.

Internal risk reporting provides the Board of Management with regular information on the risk situation, as regards the individual risk categories and the entire Group alike. This ensures that negative trends are identified in sufficient time for countermeasures to be taken. The purpose of our external risk reporting is to provide clients, shareholders and the supervisory authorities with a clear overview of the Group's risk situation.

Actual risk limits are derived from the risk strategy: taking the defined risk appetite as a basis, limits, rules and any risk-reducing measures required are approved and implemented. We also have a comprehensive early-warning system that draws our attention to any potential risks.

The risk management system is regularly audited by Group Audit.

Internal control system¹

Our internal control system is an integrated, Group-wide system for managing operational risks. Comprising two key components – the operational risk control system (ORCS) and the compliance management system (CMS) – our internal control system addresses both Group management requirements and local regulations.

¹ The section on the internal control system is part of the Combined management report and was not audited.

Operational risk control system

The operational risk control system (ORCS) is an essential part of the internal control system. At Group level, the ORCS is overseen by the Integrated Risk Management division (IRM), which reports to the Group Chief Risk Officer (Group CRO). As part of the ORCS, risk and control self-assessments are carried out at least once a year in all fields of business, and the material operational risks, including compliance-related risks, are identified and assessed in the process. Key controls and management measures to mitigate the material operational risks are analysed and assessed. In addition, the risk management function carries out independent analyses and company-wide cross-comparisons regarding operational risks and controls (monitoring). Significant control deficiencies are addressed by means of improvement measures and/or close monitoring. The main findings derived from the risk and control self-assessments and from monitoring are reported to the Board of Management and the Audit Committee of the Supervisory Board.

The identification, management and control of risks arising out of the accounting process is indispensable for the production of reliable annual financial statements at both consolidated and solo-undertaking level. Risks significant for financial reporting from a Group perspective are integrated into the internal control system in accordance with uniform criteria. The risks are checked annually by the process owners to ascertain whether they are up to date, and the controls are amended as necessary.

The standardised methodology has been implemented on the basis of a Group-wide ORCS policy and guidelines specific to the fields of business. The decision about whether to include a Group undertaking in the standardised ORCS is taken on the basis of the principle of proportionality – with due consideration being given to the nature, scale and complexity of the risks inherent in the undertaking's operations, and to compliance with regulatory and legal requirements. The Group undertakings that have not been integrated into the ORCS Group standard control their risks in compliance with the principles of good corporate governance, Group-wide principles of risk management and relevant national laws.

No material changes were made to the ORCS in the reporting period.

Compliance management system

The second key component of the internal control system is the compliance management system (CMS). At Group level, the Group Compliance & Legal (GCL) division is responsible for the CMS, which is managed by the Group Chief Compliance Officer (Group CCO). In addition to the Group function, there are local compliance functions within the fields of business, as well as decentralised compliance functions for selected compliance programmes (such as Tax Compliance). The Board of Management of Munich Reinsurance Company entrusts the development, implementation, monitoring and ongoing improvement of

the Group-wide compliance management system to the compliance function. The CMS is the methodical framework for the structured implementation of early-warning, risk-control, consulting and monitoring functions for compliance risks.

The CMS is based on an integral compliance culture, an established compliance organisation with clearly defined roles and responsibilities, and independent, suitable and qualified human resources that enable the compliance function to work effectively and efficiently.

In the scope of the CMS, compliance risks are systematically identified, analysed and appropriately handled so as to minimise the risks. This process is based on the foundation of the above-mentioned ORCS methodology. Process results are reported to the Board of Management and the Supervisory Board's Audit Committee.

No material changes were made to the CMS in the reporting period.

You will find a detailed description of the main features of the CMS in the Combined non-financial statement > Compliance.

Statement on the adequacy and effectiveness of the risk management system and the internal control system¹

In reviewing the adequacy and effectiveness of our risk management systems and internal control systems, we take into consideration many pieces of information in order to, among other things, identify any material internal control deficiencies. The primary pieces of information are as follows:

- the auditor's report on the results of the accounting-related control system,
- the annual report on the results of the ORCS,
- regular risk reporting, in particular by the Group CRO,
- regular compliance reporting, in particular by the Group CCO, on topics including key compliance metrics and the essential contents of the compliance management system, and
- regular reporting by Group Audit, especially on insights gained from audit activities about our risk management and internal control systems.

In addition, the Audit Committee of the Supervisory Board regularly requests reports on the adequacy and effectiveness of the internal control system and on changes to the risk and control landscape compared with the previous year. The audit reports from Group Audit confirm the general effectiveness of the accounting-related internal control system.

In light of the information and reports above – and considering the assessments made by experts in the divisions IRM, GCL and Group Audit – we consider our risk management systems and internal control systems to be generally adequate.

¹ The statement on the adequacy and effectiveness is part of the Combined management report and was not audited.

Based on the fact that no material violations or systematic deficiencies were identified in the reporting period, we therefore consider our risk management and internal control systems to also be generally effective.

Significant risks

Our general definition of risk is possible future developments or events that could result in a negative prognosis or a negative deviation from the Group's targets. We consider three criteria when evaluating the materiality of risks. First, the extent to which a risk could influence stakeholder assessments of Munich Re. Second, the ways in which a risk could impact the solvency of Munich Re. And third, the extent to which a risk could exhaust cumulative limits or budgets. We have applied this definition consistently to each business unit and legal entity, taking account of its individual risk-bearing capacity. The assessment of whether a risk is significant or not for a business unit or legal entity according to the above definition is performed in the responsible risk management functions. We make a basic distinction between risks included in our internal model and covered by risk-based capital and other risks not quantified in the internal model. The risks included in the internal model are divided into the following risk categories: underwriting risk in property-casualty business, underwriting risk in life and health business, market risk, credit risk and operational risk. Sustainability risks can affect all of these risk categories and are therefore an integral part of the management of these risks.

Risks depicted in the internal model

Munich Re has a comprehensive internal model that determines the capital needed to ensure that the Group is able to meet its commitments even after extreme loss events. We use the model to calculate the capital required under Solvency II (the solvency capital requirement, or SCR).

The SCR is the amount of eligible own funds that Munich Re needs to have available, with a given risk tolerance, to cover unexpected losses in the following year. It corresponds to the value at risk of the economic profit and loss distribution over a one-year time horizon with a confidence level of 99.5%, and thus equates to the economic loss for Munich Re that, given unchanged exposures, will be exceeded each year with a statistical probability of 0.5%. Our internal model is based on specially modelled distributions for the risk categories property-casualty, life and health, market, credit and operational risks. We use primarily historical data for the calibration of these distributions, complemented in some areas by expert judgement. Historical data covers a long period to provide a stable and appropriate estimate of our risk parameters. We continue to take account of diversification effects we achieve through our broad spread across various risk categories and the combination of primary insurance and reinsurance business. We also take into account dependencies between the risks, which can result in higher capital requirements than would be the case if no dependency were assumed. We then determine the effect of the loss absorbency of deferred taxes.

The table shows the solvency capital requirement for Munich Re and its risk categories as at 31 December 2023.

Solvency capital requirements (SCR)

	Reinsurance		ERGO		Diversification	
	31.12.2023	Prev. year	31.12.2023	Prev. year	31.12.2023	Prev. year
	€m	€m	€m	€m	€m	€m
Property-casualty	12,189	12,785	769	730	-547	-603
Life and health	6,815	5,771	999	883	-367	-329
Market	6,076	6,191	3,169	3,500	-966	-1,177
Credit	3,256	2,357	1,112	947	-58	-58
Operational risk	1,080	1,046	782	746	-235	-234
Other ¹	540	494	376	333		
Subtotal	29,954	28,643	7,206	7,139		
Diversification effect	-10,746	-9,982	-1,788	-1,586		
Tax	-3,705	-3,446	-922	-965		
Total	15,504	15,215	4,496	4,588	-2,025	-2,110

	Group			
	31.12.2023	Prev. year	Change	
	€m	€m	€m	%
Property-casualty	12,411	12,911	-500	-3.9
Life and health	7,447	6,325	1,122	17.7
Market	8,279	8,514	-235	-2.8
Credit	4,309	3,245	1,064	32.8
Operational risk	1,627	1,558	69	4.4
Other ¹	915	826	89	10.8
Subtotal	34,987	33,381	1,606	4.8
Diversification effect	-12,863	-11,768	-1,095	9.3
Tax	-4,151	-3,920	-231	5.9
Total	17,974	17,693	281	1.6

¹ Capital requirements for other financial sectors, e.g. institutions for occupational retirement provision.

At Group level, the SCR increased by 1.6% to €18.0bn – compared with €17.7bn as at 31 December of the previous year. This increase was mainly driven by extraordinarily strong growth in life reinsurance business and a moderate expansion of exposure to credit risks in reinsurance investments. Conversely, a more well-balanced risk profile resulted directly in better diversification across risk categories, which helped to reduce risk. In addition, the SCR for property-casualty reinsurance business decreased due to an expansion of external retrocession, a more well-balanced portfolio structure and the depreciation of the US dollar. Other information about the changes in individual risk categories and details about risk concentrations can be found in the following sections.

Property-casualty underwriting risk

The property-casualty risk category encompasses the underwriting risks in the property, motor, third-party liability, personal accident, marine, aviation and space, and credit classes of insurance, together with special lines also allocated to property-casualty. Further risk-relevant information on property-casualty business can be found in the Notes to the consolidated financial statements > Explanatory information > Disclosures on risks from financial instruments and insurance contracts > 53 Disclosures on further risks from insurance contracts.

Underwriting risk is defined as the risk of insured losses being higher than our expectations. The premium and reserve risks are significant components of the underwriting risk. Premium risk is the risk of future claims payments relating to insured losses that have not yet occurred being higher than expected. Reserve risk is the risk of the loss provisions established potentially being insufficient to cover losses that have already been incurred. In measuring loss provisions, we follow a cautious reserving approach and assess uncertainties conservatively. In every quarter, we also compare notified losses with our loss expectancy, in order to sustain a high level of reserves.

We differentiate between large losses involving expenditure that exceeds a certain large-loss limit; losses affecting more than one risk or more than one line of business (accumulation losses); and all other losses (basic losses). For basic losses, we calculate the risk of subsequent reserving being required for existing risks within a year (reserve risk) and the risk of under-rating (premium risk). To achieve this, we use actuarial methods that are based on standard reserving procedures, but take into account the one-year time horizon. The calibration for these methodologies is based on our own historical loss and run-off data. Appropriate homogeneous segments of our property-casualty portfolio are used for the calculation of the reserve and premium risks. To aggregate the risk to whole-portfolio level, we apply correlations that take account of our own historical loss experience.

Our experts develop scientifically sound models for the accumulation scenarios that quantify the probability of occurrence and the damage potential. The models also take risk-limiting elements into consideration, such as cover limits. In addition to natural catastrophes, we include other accumulation risks such as cyber and pandemics, using special models. Based on these scenarios, the potential effects on our portfolio are determined using stochastic models.

Our internal model considers the resulting accumulation-risk scenarios to be independent events. Munich Re's greatest natural hazard exposure lies in the scenarios "Atlantic Hurricane" and "Earthquake California", for which our estimates of annual loss exposure are €8.5bn (10.0bn) for Atlantic Hurricane and €6.3bn (6.3bn) for Earthquake California (before tax, retained) for a return period of 200 years.

As part of our regular validation, we look in particular at the sensitivity of results produced by the risk model for large and accumulation losses to changes in the return periods or loss amounts for events, or a change in the business

volumes written. We also consider the effect of changes of dependency assumptions on the results. We regularly adapt our models on the basis of the findings from our validation.

Another measure for controlling underwriting risks is the targeted cession of a portion of our risks to other carriers via external reinsurance or retrocession. Most of our companies have intra-Group and/or external reinsurance and/or retrocession cover.

In addition to traditional retrocession, we use alternative risk transfer for natural catastrophe risks in particular. Under this process, underwriting risks are transferred to the capital markets via special purpose vehicles.

Solvency capital requirement – Property-casualty

The solvency capital requirement decreased by around 3.9% at Group level, mainly owing to expanded external retrocession and a more well-balanced portfolio structure in reinsurance business. The depreciation of the US dollar also contributed to the drop in SCR, which was partially offset by an update to the basic loss model.

Solvency capital requirements (SCR) – Property-casualty

	Reinsurance		ERGO		Diversification	
	31.12.2023	Prev. year	31.12.2023	Prev. year	31.12.2023	Prev. year
	€m	€m	€m	€m	€m	€m
Basic losses	5,685	4,790	657	630	-476	-448
Large and accumulation losses	11,420	12,261	438	420	-335	-312
Subtotal	17,105	17,051	1,095	1,050		
Diversification effect	-4,916	-4,266	-327	-319		
Total	12,189	12,785	769	730	-547	-603

→	Group			
	31.12.2023	Prev. year	Change	
	€m	€m	€m	%
Basic losses	5,866	4,972	894	18.0
Large and accumulation losses	11,523	12,369	-846	-6.8
Subtotal	17,389	17,340	49	0.3
Diversification effect	-4,978	-4,429	-549	12.4
Total	12,411	12,911	-500	-3.9

Life and health underwriting risk

We define underwriting risk as the risk of insured benefits payable in life or health insurance business being higher than expected. Of particular relevance are biometric risks and policyholder-behaviour risks, such as lapses and lump-sum options. We differentiate between risks that have a short-term or long-term effect on our portfolio. In addition to the simple risk of random fluctuations resulting in higher claims expenditure in a particular year, the adverse developments with a short-term impact that we model notably include rare – but costly – events such as pandemics. To this end, we model losses and the sum at risk – taking into particular consideration excess mortalities in connection with, for instance, the pandemics of the 20th and 21st centuries.

Further information on the risks in life and health business can be found in the Notes to the consolidated financial statements > Explanatory information > Disclosures on risks from financial instruments and insurance contracts > 53 Disclosures on further risks from insurance contracts.

Life insurance products in particular, and a large part of our health primary insurance business, are long-term in nature, and the results they produce are spread over the entire duration of the policies. This can mean that negative developments in risk drivers with long-term effects sustainably reduce the value of the insurance portfolio (trend risks). The risk drivers mortality and disability are dominated by the life and health reinsurance segment, particularly by exposure in North America and the Asia-Pacific region. We also underwrite longevity risk in the life and health reinsurance

segment, especially in the United Kingdom. The longevity risk driver can additionally be found in the products marketed by ERGO in Germany, together with typical risks related to policyholder behaviour, such as the lapse risk. To a lesser extent, we write risks connected with the increase in treatment costs.

Risk modelling attributes probabilities to potential modified assumptions. We use primarily historical data extracted from our underlying portfolios to calibrate these probabilities, and additionally apply general mortality rates for the population to model the mortality trend risk. To enable us to define appropriate parameters for the modelling of the range of areas in which we operate, portfolios with a homogeneous risk structure are grouped together and individual comprehensive profit and loss distributions determined. We then aggregate these distributions, taking account of the dependency structure, to obtain an overall distribution.

Our largest short-term accumulation risk in the life and health risk category is a severe pandemic. We counter this risk by examining our overall exposure in detail using scenario analysis, and by deploying appropriate measures to manage the risks.

In reinsurance, we control the assumption of biometric risks by means of a risk-commensurate underwriting policy. Interest-rate and other market risks are frequently ruled out by depositing the provisions with the cedant, with a

guaranteed rate of interest from the deposit. In individual cases, these risks are also hedged by means of suitable capital market instruments. We also limit our exposure to individuals and groups of persons in life insurance.

For primary insurance, substantial risk minimisation is achieved through product design. In case of adverse developments, parts of the provision for premium refunds – which are recognised and reversed in profit or loss – are of great significance for risk-balancing. In health primary insurance, most long-term contracts include the possibility and/or obligation to adjust premiums. Practically, however, there are limits to the resilience of policyholders.

Limits are laid down for the pandemic scenarios, which affect the portfolio in the shorter term, and for the longevity scenarios and their longer-term effects in conformity with the risk strategy. We continue to analyse the sensitivity of the internal model to the input parameters on a regular basis. This relates to the interest rate, the biometric risk drivers and customer behaviour.

Solvency capital requirement – Life and health

The solvency capital requirement at Group level increased significantly by 18%, which was primarily attributable to extraordinarily strong growth in reinsurance (especially in North America). Capital market effects caused by a drop in interest rates and movements in exchange rates virtually offset each other.

Solvency capital requirements (SCR) – Life and health

	Reinsurance		ERGO		Diversification		Group	
	31.12.2023	Prev. year	31.12.2023	Prev. year	31.12.2023	Prev. year	31.12.2023	Prev. year
	€m	€m	€m	€m	€m	€m	€m	€m
Health	242	343	634	597	-68	-82	808	857
Mortality	5,023	4,343	221	176	-35	-15	5,209	4,504
Disability	3,786	3,111	193	175	-18	1	3,961	3,287
Longevity	1,150	942	518	409	-25	-17	1,644	1,333
Other	380	298					380	298
Diversification	-3,766	-3,266	-568	-474			-4,554	-3,955
Total	6,815	5,771	999	883	-367	-329	7,447	6,325

Market risk

We define market risk as the risk of economic losses resulting from price changes in the capital markets. It includes equity risk, general interest-rate risk, specific interest-rate risk, property-price risk and currency risk. The general interest-rate risk relates to changes in the basic yield curves, whereas the specific interest-rate risk models changes in credit risk spreads – for example, on euro government bonds from various issuers, or on corporate bonds. We also include in

market risk the risk of changes in inflation rates (depicted in the subcategory “general interest-rate risk”) and implicit volatilities (cost of options). Fluctuations in market prices affect not only our investments, but also the underwriting liabilities – especially in life primary insurance. Due to the long-term interest-rate guarantees given in some cases and the variety of options granted to policyholders in traditional life insurance, the amount of the liabilities can be highly dependent on conditions in the capital markets.

Market risks are modelled by means of Monte Carlo simulation of possible future market scenarios. We revalue our assets and liabilities for each simulated market scenario, thus showing the probability distribution for changes to basic own funds.

We use appropriate limit and early-warning systems in our asset-liability management to manage market risks. Derivatives such as equity futures, options and interest-rate swaps – which are predominantly used for hedging

purposes – also play a role in our management of the risks. The impact of derivatives is taken into account in the calculation of solvency capital requirements. Further information on derivative financial instruments can be found in the Notes to the consolidated financial statements > Explanatory information > Notes to the consolidated balance sheet – Assets > 16 Financial investments and also > 18 Insurance-related financial instruments, as well as under Notes to the financial instruments and fair value disclosures on assets and liabilities > 47 Hedge accounting.

Solvency capital requirements (SCR) – Market

	Reinsurance		ERGO		Diversification	
	31.12.2023	Prev. year	31.12.2023	Prev. year	31.12.2023	Prev. year
	€m	€m	€m	€m	€m	€m
Equity risk	3,399	2,943	1,337	1,736	-123	-219
Interest-rate risk	2,844	2,654	1,763	1,970	-923	-968
General interest-rate risk	2,163	2,002	1,171	1,280	-631	-459
Specific interest-rate risk	1,387	1,145	1,246	1,518	-309	-432
Diversification interest-rate risk	-706	-492	-654	-828	18	-77
Property risk	1,631	1,724	630	767	-67	-137
Currency risk	4,207	4,234	239	211	-83	-45
Subtotal	12,082	11,555	3,970	4,685		
Diversification effect	-6,006	-5,363	-801	-1,185		
Total	6,076	6,191	3,169	3,500	-966	-1,177

	Group			
	31.12.2023	Prev. year	Change	
	€m	€m	€m	%
Equity risk	4,614	4,461	153	3.4
Interest-rate risk	3,685	3,656	29	0.8
General interest-rate risk	2,703	2,822	-119	-4.2
Specific interest-rate risk	2,324	2,230	94	4.2
Diversification interest-rate risk	-1,342	-1,397	55	-3.9
Property risk	2,195	2,354	-159	-6.8
Currency risk	4,363	4,400	-37	-0.8
Subtotal	14,856	14,870	-14	-0.1
Diversification effect	-6,578	-6,356	-222	3.5
Total	8,279	8,514	-235	-2.8

Solvency capital requirement – Market

The solvency capital requirement declined by 2.8% at Group level. Detailed information on the changes in the individual subcategories is available in the following sections.

Equity risk

The minor increase in the equity risk was due to a rise in equity exposure.

Interest-rate risk

The general interest-rate risk in the reinsurance field of business rose slightly. The specific interest-rate risk rose on account of higher exposure to fixed-interest securities with credit risk exposure, which was attributable, among other things, to the restructuring of portfolios and to higher market values caused by lower interest rates.

The interest-rate risks in the ERGO field of business were down, mainly owing to the restructuring of portfolios and more dynamic modelling of volatility adjustments. The decrease in interest-rate risks was partially offset by lower interest rates.

In the reinsurance field of business, the market value of interest-sensitive investments as at 31 December 2023 was €74.0bn (70.1bn). Measured in terms of modified duration, the interest-rate sensitivity of those investments was 4.7 (4.8), while that of the liabilities was 4.5 (5.0). A decrease in interest rates of one basis point led to a change in available own funds amounting to around €9.0m (6.4m).

In the ERGO field of business, the market value of interest-sensitive investments was €109.3bn (105.9bn). The modified duration was 7.8 (7.6) for interest-sensitive investments and 7.1 (6.9) for liabilities. A decrease in interest rates of one basis point led to a change in available own funds amounting to around €2.4m (6.0m).

Property risk

The property risk decreased slightly, mainly on account of lower market values.

Currency risk

The currency risk sank slightly due to modified positions in foreign currencies.

Credit risk

We define credit risk as the financial loss that Munich Re could incur as a result of a change in the financial situation of a counterparty. In addition to credit risks arising out of investments in securities and payment transactions with clients, we actively assume credit risk through the writing of credit and financial reinsurance and in corresponding primary insurance business.

When determining credit risks, Munich Re uses a portfolio model that is calibrated over a longer period (at least one full credit cycle); it also takes account of changes in fair value caused by rating migrations and debtor default. The credit risk arising out of investments (including government bonds and credit default swaps, or CDSs), deposits retained on assumed reinsurance and reserves ceded is calculated by individual debtor. If the credit risk does not exclusively depend on the debtor's creditworthiness, but also on other factors (such as subordination, guarantees or collateralisation), these are also taken into account. We use historical capital market data to determine the associated migration and default probabilities. Correlation effects between debtors are derived from the sectors and countries in which they operate, and sector and country correlations are based on the interdependencies between the relevant stock indices.

The calculation of the credit risk in "Other receivables" is based on internal expert assessments. We also capitalise the credit risk for highly rated government bonds. Information on ratings can be found in the Notes to the consolidated financial statements > Explanatory information > Disclosures on risks from financial instruments and insurance contracts > 51 Disclosures on risks from financial instruments.

Risk concentrations are mainly in government bonds issued by countries inside and outside the European Union. In addition, corporate bonds, pfandbriefs and similar covered bonds account for a large proportion of the investments.

We use a cross-balance-sheet counterparty limit system valid throughout the Group to monitor and control our Group-wide credit risks. The limits for each counterparty (a group of companies or country) are based on its financial situation as determined by the results of our fundamental analyses, ratings and market data, and the risk appetite defined by the Board of Management. The utilisation of limits is calculated on the basis of risk-weighted exposures. There are also volume limits for securities lending and repurchase transactions. Group-wide rules for collateral management – for example, for over-the-counter derivatives and catastrophe bonds issued – reduce the resultant credit risk.

In monitoring the country risks, we do not simply rely on the usual ratings, but perform independent analyses of the political, economic and fiscal situation in the countries issuing bonds in which Munich Re is most heavily invested. In this regard, climate-change-related risks are also considered. On this basis, and taking account of the investment requirements of the fields of business in the respective currency areas and countries, limits or specific measures are approved. These are mandatory throughout the Group for investments and the insurance of political risks.

The sensitivities in the credit risk model are regularly checked against the most important input parameters. This primarily concerns the recovery rates from insolvent debtors, the probabilities of debtor migration between rating classes, and the parameters for correlations between debtors. All validations demonstrated the appropriateness of the modelling approaches used.

We manage credit default risk in retrocession and external reinsurance with the assistance of limits determined by the Retro Security Committee. Information on our default risks from insurance business and from reinsurance contracts held that are assets can be found in the Notes to the consolidated financial statements > Explanatory information > Disclosures on risks from financial instruments and insurance contracts > 53 Disclosures on further risks from insurance contracts.

Solvency capital requirement – Credit

The solvency capital requirement rose by 32.8% at Group level, resulting primarily from a moderate increase in investments with credit risk exposure in reinsurance. In addition, slightly lower interest rates for longer maturities led to higher market values of fixed-interest securities.

Operational risk

We define operational risk as the risk of losses resulting from inadequate or failed internal processes, incidents caused by the actions of personnel or system malfunctions, or external events. This includes criminal acts committed by employees or third parties, insider trading, infringements of antitrust law, business interruptions, inaccurate processing of transactions, non-compliance with reporting obligations, and disagreements with business partners.

We use scenario analyses to quantify operational risks. The results are fed into the modelling of the solvency capital requirement for operational risks and are validated using various sources of information, such as the ORCS findings and both internal and external loss data.

The sensitivity in the internal model is regularly checked against the most important input parameters. This mainly relates to the dependence of the result on frequency and loss amounts and the parameters for the correlations between scenarios. The analyses showed no anomalies in the year under review.

Solvency capital requirement – Operational risk

At Group level, the solvency capital requirement for operational risks increased slightly by 4.4% owing to updated assessments in selected scenarios.

Security risk

Security risk is an integral component of operational risk. We define security risks as risks resulting from threats to the security of our employees, data, information, and property. We have intensified our monitoring of cyber risks in recognition of the increasing importance of information technology for Munich Re's core processes and the dynamic environment of cyber crime.

The Group Chief Information Security Officer (CISO), a function that is assigned to risk management, is responsible for the central and Group-wide coordination and control of all activities involving information security risks. Security risk committees have also been set up in the fields of business to assess and manage security risks. The members of the security risk committees are managers from operational units (e.g. IT Security), the control functions (e.g. Risk Management, Information Security, and Data Protection), and representatives from the divisional units.

To further improve cyber security, we are working on initiatives both specific to and across the fields of business to ensure a level of protection in line with our information security strategy. Further information can be found in the Combined non-financial statement > Responsible digital transformation, data protection and information security.

Other risk categories

As is typical throughout the industry and in accordance with regulatory requirements, the risk types specified below are not explicitly capitalised in our internal model. Qualitative risk management is very important for dealing with these risks.

Reputational risk

We define reputational risk as the risk of loss that may result from a deterioration in the Group's public image among clients, shareholders or other parties. Our reputation is affected by our behaviour in a number of areas, such as client relationships, product quality, corporate governance, earnings power, our treatment of employees and corporate responsibility. Reputational risk is closely intertwined with all other risk categories. The assessment of individual business transactions in terms of their reputational risk is performed at field-of-business level by reputational risk committees. Where a reputational risk could potentially have an impact across fields of business, other central divisions may be involved in the assessment if required.

Strategic risk

We define strategic risk as the risk of making wrong business decisions, implementing decisions poorly, or being unable to adapt to changes in the operating environment. Existing and new potential for success in the Group and the fields of business in which it operates creates strategic risks. At Munich Re, strategic risks are identified, assessed and managed in a recurring process comprising a strategic dialogue in the Strategy Committee of the Board of Management (StratC) and annual planning. Furthermore, the Group-wide annual (financial) planning process is integrated into the strategic dialogue within the StratC. This annual planning process includes analysing financial sensitivities and risks as well as assessing the capital management and risk strategy. These process steps are mirrored in the primary insurance and reinsurance fields of business and in investment management. In this way, we put our strategy to the test in close dialogue with the various stakeholders at different levels (Group, primary insurance and reinsurance, asset management). The above processes ensure that the Board of Management addresses the strategic risks in detail and is well placed to monitor and manage them. The Group CRO is involved in both the strategic and operational business planning as well as in significant company sales, mergers and acquisitions.

Liquidity risk

Our objective in managing liquidity risk is to ensure that we are in a position to meet our payment obligations at all times.

The liquidity risk is managed within the framework of our holistic risk strategy, with the Board of Management defining limits on which minimum liquidity requirements for our operations are based. Compliance with minimum requirements is continually monitored and regularly reported to the Board of Management. Using quantitative risk criteria, we ensure that Munich Re has sufficient liquidity available to meet all its payment obligations even under adverse scenarios, with the liquidity position being assessed both for extreme insurance scenarios and for adverse situations in the capital markets.

Further information on liquidity risks in life and health insurance business and in property-casualty insurance business can be found in the Notes to the consolidated financial statements > Explanatory information > Disclosures on risks from financial instruments and insurance contracts > 53 Disclosures on further risks from insurance contracts.

Solvency ratio under Solvency II

The solvency ratio under Solvency II is the ratio of the eligible own funds to the solvency capital requirement.

Solvency II ratio¹

		31.12.2023	Prev. year	Change
Eligible own funds ²	€m	47,979	46,019	1,960
Solvency capital requirement	€m	17,974	17,693	281
Solvency ratio under Solvency II	%	267	260	

- 1 Eligible own funds excluding the application of transitional measures for technical provisions; including the application of transitional measures for technical provisions, the own funds amounted to €52.5bn (51.1bn); Solvency II ratio: 292% (289%).
- 2 Driven by economic earnings of €5.6bn, the eligible own funds increased as at the reporting date. The following factors had a reducing effect on eligible own funds: the dividend of €2.0bn agreed by the Board of Management and to be proposed to the Annual General Meeting for the 2023 financial year; the share buy-back programme with a volume of €1.0bn; the adjustment to the opening balance amounting to –€0.1bn; and other measures totalling €0.5bn.

The eligible own funds as at the reporting date take into account a deduction for the dividend of €2.0bn agreed by the Board of Management and proposed to the Annual General Meeting for the 2023 financial year.

Other risks

Economic and financial-market developments and regulatory risks

Munich Re is heavily invested in the eurozone, and – in reinsurance in particular – in the US dollar currency area, a consequence of our global business activities in these currency areas. We prioritise maintaining a correspondingly broad diversification of investments to cover our insurance liabilities. We take various risk management measures to counter fluctuations in the capital markets that can lead to volatilities in the Group's own funds.

There was moderate growth overall in the global economy in 2023. However, the eurozone and especially Germany stood out negatively, as high inflation, higher interest rates and sustained elevated energy prices in particular burdened households and manufacturers. In the United States, strong consumer spending fuelled by a persistently worker-friendly job market helped to boost the economy. There was also more investment in fixed assets – despite higher refinancing costs and thanks in part to government assistance as part of the Inflation Reduction Act and other programmes. Growth momentum remained weak in China, where problems in the real-estate and shadow-banking sectors still threaten to spread.

Inflation rates have decreased compared with the previous year. Despite sustained high forecast uncertainty, we expect inflation in the USA and the eurozone to continue easing. However, demographic change in Germany is exacerbating the shortage of labour and fostering high wage pressure, which could in turn contribute to prolonged inflation.

For Munich Re, above-average inflation rates can have a particularly adverse effect on its claims reserves. However, we believe that expected inflation rates are adequately taken into account by applying the standard actuarial methods, which address the effects of inflation, and by our conservative reserving approach. Nevertheless, there is a risk that inflation exceeds forecasts and remains high for longer than anticipated, in turn impacting the business operations, financial position and performance of the Group. Although Munich Re protects itself against accelerated inflation by holding inflation-linked bonds and inflation-linked assets such as property, commodities and infrastructure, these measures would not be sufficient to fully mitigate the repercussions of inflation. Conversely, the strong increase in interest rates in the eurozone associated with high inflation has been a significant relief for life insurance companies with guaranteed minimum interest rates. Although the number of lapses could increase as soon as interest rates rise significantly above the guaranteed interest rate, Munich Re life insurance companies have not on the whole observed such a trend. Thus far, both the positive impact on earnings capacity and the solvency ratio of life insurance companies significantly outweigh the lapse risk.

In this environment, the general risk of insolvency is also elevated and risks could worsen in the real-estate and banking sectors. Higher interest rates also make refinancing more costly for governments and necessitate budgetary consolidation. Lower real income, reduced discretion for the allocation of money, and plans for economic transformation can trigger social unrest, more protests, more labour strikes and political instability. A lack of stability will likely pervade upcoming elections, consequently increasing the risk of abrupt changes in ruling parties and the risk of political deadlock. The US general election in November could lead to economic policy that is more isolationist and protectionist.

We regard geopolitical risks in our planning period as very relevant. In addition to the war in Ukraine, which continues to be fought with the same intensity, and the shifts in the balance of power, with China as the key player, 2023 was marked by a further increase in geopolitical crises. These included clashes and coups, both attempted and successful, in sub-Saharan Africa (Sudan, Niger, Sierra Leone, Gabon, Burkina Faso), Azerbaijan's seizure of Nagorno-Karabach, the tensions on the Kosovo-Serbian border and, first and foremost, Hamas' attack on Israel. Munich Re is observing the developments closely and is analysing the risks in regions where it has substantial exposures.

We have conducted detailed analyses of potential losses in various war scenarios (particularly China/Taiwan, Russia and the Baltic states, and a nuclear escalation of the war between Russia and Ukraine), with a focus on direct war cover. We regard any potential indirect consequential losses or collateral damage or implications for capital markets as extremely dependent on a given assumption. Our analyses indicate that the direct exposures are manageable and do not necessitate any modifications to our risk strategy. Although the indirect consequences – particularly capital market upheavals – could be material and exceed the direct losses, they are subject to considerable uncertainty, which severely restricts the scope for taking preventive measures or recommending courses of action.

Global players such as Munich Re are subject to increased fiscal pressure nationally and internationally, as well as a higher audit intensity. Given the current political emphasis on an appropriate taxation of international companies and the introduction of a global minimum tax rate, which has been applied in the EU since 1 January 2024, this trend will continue and intensify.

Climate change

Climate change is an emerging risk that represents the central sustainability risk in relation to the environment. Climate-related risks arise in the form of physical and transition risks, with interdependencies between both risk types. Physical risks arise from the increasing frequency and severity of extreme weather events (hurricanes, wildfires, severe convective storms, floods, etc.) and chronic changes such as sea level rise. Transition risks arise particularly as a consequence of political or economic measures to shift to a low-carbon economy or reactions to changing living conditions in certain regions. Both types of risks involve medium-term and long-term effects, but can also have disruptive, short-term consequences. Any assessment of how these risks will impact Munich Re's exposures in the long term is subject to a high degree of uncertainty. This is because the transition path and the way it affects other emerging risks are uncertain, as are the resulting impacts on known risk drivers such as premium and reserve risks or the impact of changes in share prices, interest rates or exchange rates on investments. We are therefore working intensively on the impact of climate change on our Group. Consequently, we have performed cross-balance sheet scenario analyses in order to estimate how resilient the company is in the event of various climate change scenarios and in order to devise specific actions to be taken.

On the basis of these scenario analyses, we more closely assessed potential risks arising from climate suits (lawsuits in connection with climate change). In the process, potential exposures to litigation risk in our insurance portfolio were identified as a material risk. To counter this risk, we have

issued/updated a range of topic papers and best practices that provide underwriters with standard clauses and update them on developments in case law. Respective training is also offered. Furthermore, the new product process criteria were expanded to include ESG aspects such as greenwashing risk.

We do not see any material additional risk in property insurance arising from climate change. This is due to our ability to regularly adapt risk and natural-hazard models to take the effects of climate change into appropriate consideration. For the majority of our underwriting portfolio, the annual renewals process provides the opportunity to react at short notice to negative developments and negotiate premium adjustments and/or new contractual terms such as limits. Further information – in particular on the probable maximum loss (PML) to our insurance portfolio from climate-related natural catastrophes for a 200-year return period – is available in the Combined non-financial statement > Insurance activities.

In the long term, however, a material strategic risk could arise. For example, at some point the risk-commensurate prices for insurance products could exceed what customers are willing to pay, which would make insuring against certain types of risk unaffordable for customers or unfeasible for insurers (financial limits of insurability). Munich Re counters this risk by generally ensuring that its risk strategy includes a diversified insurance portfolio.

In the life and health reinsurance segment, we have analysed the potential effects of climate change on the mortality and health of insureds in our portfolios. Climate change scenarios relate to much longer periods than our usual scenarios for potential trend risks. Reliable quantitative information is only available to a limited extent and depends heavily on a variety of potential climate change pathways. The effects are dependent on climate forecasts and a population's demographic and geographic composition. Older people and socio-economically disadvantaged groups are at greatest risk. It is very difficult to identify deaths in which climate was a contributing factor. Furthermore, the insured population may be less severely impacted by the effects of climate change than the overall population. Our analyses indicate that the two greatest potential physical risks for life and health insurance are extreme heat events in the United States and Asia as well as the unabated increase in average temperatures, which may ultimately lead to more

frequent epidemics/pandemics. Although the quantitative information on these topics is subject to considerable uncertainty, we do not currently anticipate climate change to have any material effects on our exposures.

With reference to our investments, we see a relevant risk in illiquid investments with long maturities. The due diligence process for alternative investments therefore includes analysing potential location-specific threats due to climate change. In addition, we continually monitor and limit the concentration and liquidity risks affecting our investments. We therefore consider the impacts of climate change on our investments not to be a material risk overall.

Legal risks

As part of the normal course of business, Munich Re companies are involved in court, regulatory and arbitration proceedings in various countries. The outcome of those or possibly imminent proceedings is neither certain nor predictable. However, we believe that none of these proceedings will have a significant negative effect on the financial position of Munich Re. Such proceedings are dealt with using combined expertise within the individual departments and units.

Assessment of the risk situation

In accordance with the prescribed processes, our Board committees explicitly defined the risk appetite for significant risk categories in the year under review, and quantified it with key figures. We determined and documented the risk appetite across the Group hierarchy and communicated it throughout the Group. In 2023 risk exposures were regularly quantified and compared with the risk appetite. They were reported on and discussed in the relevant committees.

At 267%, the Solvency II ratio is at a very comfortable level above our communicated optimal range of 175–220% (without application of transitional measures). Munich Re thus continues to have a very solid capital base. Based on up-to-date findings and on our internal model, Munich Re's Solvency II ratio (without application of transitional measures) would be at least within or above the optimal range even in the event of major loss events and negative capital market effects. We therefore assess Munich Re's risk situation to be manageable and under control.

Further risk figures¹

Premium risks and reserve risk in property-casualty insurance

The degree of exposure to premium risks differs according to class of business and also between primary insurance

and reinsurance. On the basis of the loss ratios and combined ratios shown in the following table, conclusions can be drawn about the volatilities in the different classes of business and about possible interdependencies.² The differences are due to fluctuations in claims expenditure and fluctuations in the respective market-price level for the covers granted.

Loss ratios and combined ratios by class of business

	2023	2022
Loss ratio in %		
Reinsurance		
Liability	89.8	76.9
Accident	75.9	67.9
Motor	94.2	77.8
Marine, aviation, space	60.5	83.6
Fire and other property insurance	58.4	65.7
Engineering	51.6	42.4
Credit and surety	57.9	25.1
Other classes of business	66.1	56.3
ERGO Property-casualty Germany	59.1	61.2
ERGO International ¹	59.3	63.9
Combined ratio in %		
Reinsurance		
Liability	102.7	89.2
Accident	89.6	82.1
Motor	109.4	94.5
Marine, aviation, space	79.3	105.4
Fire and other property insurance	74.0	80.6
Engineering	72.7	62.7
Credit and surety	67.8	35.8
Other classes of business	79.6	69.7
ERGO Property-casualty Germany	88.9	90.3
ERGO International ¹	90.1	95.5

1 Excluding life insurance business and health insurance conducted like life insurance.

In the pricing of risks assumed in the motor, fire and other property insurance, and marine lines of business, and also in sections of engineering reinsurance and ERGO, there is a high degree of sensitivity regarding the underlying

assumptions about natural catastrophes. The following table therefore shows the combined ratios for property-casualty reinsurance, including and excluding natural catastrophe losses.

Combined ratio in property-casualty reinsurance for the last ten years¹

%	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014
Including natural catastrophes	85.2	83.2	99.6	105.6	100.2	99.4	114.1	95.7	89.7	92.7
Excluding natural catastrophes	76.2	74.5	87.6	101.6	90.2	92.6	92.1	90.2	88.8	89.4

1 Due to the application of IFRS 4 for financial years preceding 2022, and to the increased limit for major risks from 1 January 2023 (€30m, previously €10m), the values shown in the table are only comparable to a limited extent.

1 In accordance with German Accounting Standard No. 20 (GAS 20).

2 Further information on the combined ratio can be found under "Tools of corporate management and strategic financial objectives", and in the Notes to the consolidated financial statements > Explanatory information > Segment disclosures > 7 Alternative performance measures.

Major losses, by which we mean individual losses exceeding €30m, are particularly relevant in property-casualty reinsurance.

Large losses in property-casualty reinsurance (net)¹

€m	2023	2022
Large losses	3,278	3,741
Thereof:		
Natural catastrophe losses	2,335	2,118
Thereof:		
Other accumulation losses	943	1,623

¹ The figure is only comparable to a limited extent with the same period last year, as the major-loss threshold was raised to €30m with effect from 1 January 2023 (previous years: €10m).

The provision for outstanding claims is subject to a reserve risk, i.e. the risk that actual claims settlement may be less than or exceed the amount reserved. Information on the development of claims and claims payments over time can be found in the Notes to the consolidated financial statements > Explanatory information > Notes to the consolidated balance sheet – Equity and liabilities > 28 Liability for incurred claims. A particular sensitivity to reserve risks exists in the case of contracts with long run-off periods. This characteristic applies especially to third-party liability insurance, where liabilities may manifest themselves after a considerable latency period.

Risks from defaults on receivables from insurance business

As at 31 December 2023, the accounts receivable for reinsurance contracts held were split between the following ratings (based on those of Standard & Poor's):

Rating of accounts receivable¹

€m	31.12.2023	Prev. year
AAA	0	0
AA	105	86
A	164	156
BBB and lower	6	12
No external rating	116	278

¹ The previous year's figures are based on IFRS 4.

Of all our receivables on underwriting business at the reporting date, €644m (646m)¹ were outstanding for more than 90 days. The receivables on underwriting business are included in the carrying amounts of insurance contracts issued and reinsurance contracts held. The average default rate for the last three years was 1.1% (1.4%)¹.

Further information on underwriting risks (including biometric risks, lapse risk and interest-rate risk), market risks, and default risks in life insurance can be found in the Notes to the consolidated financial statements > Explanatory information > Disclosures on risks from financial instruments and insurance contracts > 53 Disclosures on further risks from insurance contracts. In addition, this section includes information on liquidity risk in connection with maturity date analyses of contractual net cash flows and amounts payable on demand.

¹ The figure for the previous year was based on IFRS 4.